CASIO
DT-X30 Series
Windows Mobile OS
Software Manual

(Version 1.00)

CASIO Computer Co., Ltd.

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Editorial Record

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1.00	May 2009	all	Original version

Preview

The features and specifications described in this reference manual give you an overview of the functional detail of the DT-X30 series handheld terminals with the integrated Windows Mobile® Version 6.1 OS.

For DT-X30 series handheld terminals with the integrated Windows® CE OS, see DT-X30 Software Manual available separately.

1. Product Overview

1.1 Model by Feature

The major features integrated in each model of the DT-X30 series are shown below.

Table 1.1

Model no.	OS (Note 1)	Scan Engine	WLAN (802.11 b/g)	WWAN (GSM, GPRS, EGPRS/EDGE), GPS	Bluetooth	Camera
DT-X30R-15	Mobile	Laser	Yes	No	Yes	No
DT-X30GR-15	Mobile	Laser	Yes	Yes	Yes	No
DT-X30GR-15C	Mobile	Laser	Yes	Yes	Yes	Yes
DT-X30R-35	Mobile	Imager	Yes	No	Yes	No
DT-X30GR-35	Mobile	Imager	Yes	Yes	Yes	No
DT-X30GR-35C	Mobile	Imager	Yes	Yes	Yes	Yes
DT-X30G-35U	Mobile	Imager	No	Yes	Yes	No
DT-X30G-35UC	Mobile	Imager	No	Yes	Yes	Yes

Notes:

1. "Mobile" denotes that the model integrates Windows Mobile® 6.1 English Version for its operating system.
2. The table shows all the models with Windows Mobile® OS available current as of May 2009.

1.2 Available Options

The following dedicated options are available for DT-X30 series.

Table 1.2

Option	Product		Model no.	Remark
Cradle	USB Cradle		HA-G60IO	
	Ethernet Cradle		HA-G62IO	
Battery	Battery Pack		HA-G20BAT	
Battery charger	Dual Battery Charger		HA-G32DCHG	
	Cradle-type Battery Charger		HA-G30CHG	
	Car Mounted-type Battery Charger		HA-G35CHG	
AC Adaptor			AD-S42120B	For HA-G60IO, HA-G62IO, HA-G30CHG, HA-G32DCHG
Power Cable for AD-S42120B			AC-CORD-EU	For Europe
			AC-CORD-US	For USA/Canada
			AC-CORD-TW	For Taiwan
			AC-CORD-KR	For Korea
			AC-CORD-AU	For Australia
Cable		USB cable	DT-380USB	For cradle - PC
Others		Screen Protect Sheet	HA-G90PS5	

2. Functions

This chapter describes about detailed specifications of the functions implemented in the terminal and the options.

2.1 Basic Specifications

This chapter describes about basic specifications of the terminal.

2.1.1 Windows Mobile 6.1

The terminal integrates Microsoft® Windows Mobile® Version 6.1 as its operating system. The operating system features with the following capabilities.

- Easy-to-use user interface
- Improvement of kernel (note)
- Large file size (4GB) is supported.
- SDHC card (SDHC Ver2.0 standard) is supported.
- RDP6.0 is supported.
- Easy development thanks to open environment.
- PPC application operation with AYGShell
- .NET Compact FrameWork 2.0 is supported.
- High speed processing

2.1.2 Display

Basic Specifications

The QVGA (320 x 240 dots) mode is supported by the terminal.

Table 2.1

Display specification		65,536 colors 2-way TFT LCD* (16 bpp, Red: 5 bits, Green: 6 bits, Blue: 5 bits)
Display size	X direction	240 dots
	Y direction	320 dots

* Dead Pixels

The LCD panel employed in this product uses high precision and substantial number of components which commonly cause a small number of the pixels not to light or to remain lit all the time. This is due to the characteristics of LCD panel yield in accuracy over 99.99% and permissible.

Backlight Brightness

- A brightness of the backlight can be changed at the Control Panel.
- Setting can be made in one of nine grades for power source either when the power is provided by an external power supply (with connected AC Adaptor via cradle) or when the power is provided by the installed lithium-ion battery pack.
- Setting can be made in application by using **ExtEscape()API** function.
- If the brightness is set to 1 (minimum), the backlight is turned off.
- The default is 9 (maximum) when an external power source is used or 7 when the lithium-ion battery pack is used.

The functions of the System Library relevant to the Backlight Brightness are as follows.

SysGetBLBattery : Retrieves brightness of the screen when the power is supplied by battery pack.

SysSetBLBattery : Sets up brightness of the screen when the power is supplied by battery pack.

SysSetBLExpower : Sets up brightness of the backlight when the power is supplied by external power.

SysGetBLExpower : Retrieves brightness of the backlight when the power is supplied by external power.

SysGetBLMaximum : Retrieves the maximum value of brightness for the backlight.

Backlight Auto Dimming

The Control Panel can be used to set up whether or not the Auto Dimming function is used and the waiting time until when dimming begins. Auto dimming is set effect only when the power is provided by the lithium-ion battery pack. It will not function when an external power supply is used.

- If the terminal is left over in idle state - absolutely no key input - while the power is turned on, the backlight will be automatically dimmed to save the power after a given period of time has been elapsed. When the terminal is in the auto dimmed state, a press of key disables the auto dimming function to resume the brightness.
- While the Auto Dimming function has been set effect, the brightness can be set in one of eight grades. The default is 3. During the Auto Dimming function being set effect, the brightness cannot be set any brighter than the brightness illuminated by the backlight. The defaults are "Enable the auto dimming function" and "1 minute" for waiting time period until when the Auto Dimming function activates.

Auto Backlight OFF

The Control Panel can be used to set up whether or not the Auto Backlight OFF function will be used and the waiting time until when the Auto Backlight OFF function activates. The Auto Backlight OFF function is operable for both when the power is provided by an external power source and when it is provided by the lithium-ion battery pack.

- If the terminal is left over in idle state - absolutely no key - with the power being turned on, the backlight will be automatically turned off to save the power.
- When the terminal is in the Auto Backlight OFF state, pressing a key disables the Auto Backlight OFF function to resume the brightness.
- While the power is being provided by the lithium-ion battery pack and both the Auto Dimming function and the Auto Backlight OFF function have been set enabled, either one of the functions with preset time period shorter than the other will have the priority. The default is "Enable the Auto Backlight OFF function" and "5 minutes for the waiting time" until when the Auto Backlight OFF function activates.

Flipping Display Screen

Flipping display screen at 90, 180 or 270 degree is supported.

- The System Library can be used to set up an angle to flip the screen in application.
- **ChangeDisplaySettingEx() API** function can be used to set up this display screen flip feature in application.

See Microsoft Help for detail about **ExtEscape()** and **ChangeDisplaySettingEx() API** functions.

The functions of the System Library relevant to the Flipping Display Screen are as follows.

SysSet180Rotate : Sets up a flip angle for the screen.
SysGet180Rotate : Retrieves the status of flip angle for the screen.

2.1.3 Touch Panel

An input can be made into any portion of the screen on the touch panel. The touch panel has the following resolutions.

Table 2.2

Resolution	X direction	240 dots
	Y direction	320 dots

- Capturing touch coordinates in X and Y directions and controlling the pointing are possible by application. Prior to using the touch panel for the first time, calibrating the touch panel is required.

Tap Sound

The Control Panel can be used to set up the tap sound to mute, low or loud.

Tap and Hold

By tapping and holding onto a specific object on the screen, the related pop-up menu appears.

Flipping Touch Panel Coordinates

When the screen flips, the coordinates of the touch panel also flip in unison.

Touch Panel Calibration

Calibration on the touch panel can be initiated either using the Welcome wizard appeared after disk clear or by simultaneously pressing Fn and 4 keys.
The touch panel may require periodical calibration if it slipped off due to aged deterioration, voltage fluctuation, temperature change, etc. If it happed on your screen, perform the calibration using one of the methods.

2.1.4 Keys

Keyboard Layout

The following is the keyboard layout employed in the terminal.

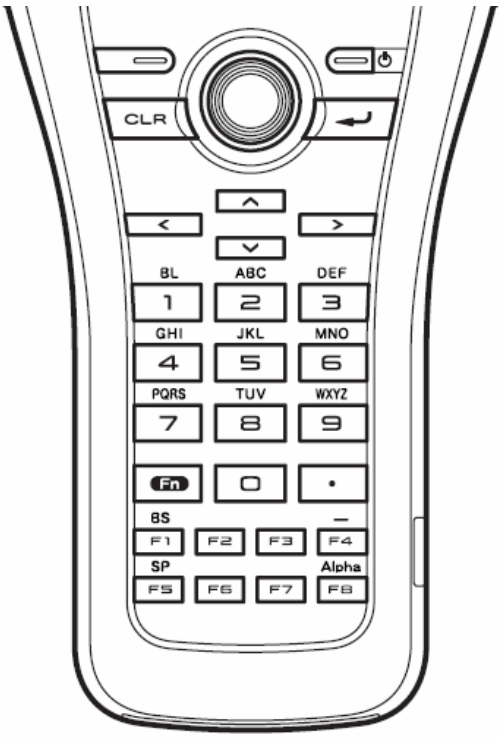


Figure 2.1

Key Assignments

The following are the key codes and function assignments.

Table 2.3 Control keys

KEY	Input mode		Operation	Remarks
Fn	----	1	Specialized key operation (toggle).	Fn mode is released when a key input is made.
		A	Specialized key operation (toggle).	
		a	Specialized key operation (toggle).	
CLR	Character input mode	1	Deletes one character to the left.	
		A	Deletes one character to the left.	
		a	Deletes one character to the left.	
	Function mode	F	Performs as ESC key.	
⏎	Character input mode	1	Performs as Enter key.	
		A	Performs as Enter key.	
		a	Performs as Enter key.	
	Function mode	F	Performs as Shift and Enter keys.	
↑	Character input mode	1	Performs as Cursor up key.	
		A	Performs as Cursor up key.	
		a	Performs as Cursor up key.	
	Function mode	F	Performs as Shift and TAB keys.	
↓	Character input mode	1	Performs as Cursor down key.	
		A	Performs as Cursor down key.	
		a	Performs as Cursor down key.	
	Function mode	F	Performs as TAB key.	
←	Character input mode	1	Perform as “Cursor left key”.	
		A	Perform as “Cursor left key”.	
		a	Perform as “Cursor left key”.	
	Function mode	F	Perform as “Cursor left key”.	
→	Character input mode	1	Perform as “Cursor right key”.	
		A	Perform as “Cursor right key”.	
		a	Perform as “Cursor right key”.	
	Function mode	F	Perform as “Cursor right key”.	

Table 2.4 Function keys

KEY	Input mode		Operation	Remarks
F1	Character input mode	1	Performs as F1 key.	Left Soft Key
		A	Performs as F1 key.	Left Soft Key
		a	Performs as F1 key.	Left Soft Key
	Function mode	F	Performs as BS key.	
F2	Character input mode	1	Performs as F2 keys.	Right Soft Key
		A	Performs as F2 keys.	Right Soft Key
		a	Performs as F2 keys.	Right Soft Key
	Function mode	F	Performs as F2 keys.	Right Soft Key
F3	Character input mode	1	Performs as F3 key.	
		A	Performs as F3 key.	
		a	Performs as F3 key.	
	Function mode	F	Performs as F3 key.	
F4	Character input mode	1	Performs as F4 key.	
		A	Performs as F4 key.	
		a	Performs as F4 key.	
	Function mode	F	Performs as “–” (Hyphen) key.	
F5	Character input mode	1	Performs as F5 key.	
		A	Performs as F5 key.	
		a	Performs as F5 key.	
	Function mode	F	Performs as Space key.	
F6	Character input mode	1	Performs as F6 key.	Volume up
		A	Performs as F6 key.	Volume up
		a	Performs as F6 key.	Volume up
	Function mode	F	Performs as F6 key.	Volume up
F7	Character input mode	1	Performs as F7 key.	Volume down
		A	Performs as F7 key.	Volume down
		a	Performs as F7 key.	Volume down
	Function mode	F	Performs as F7 key.	Volume down
F8	Character input mode	1	Performs as F8 key.	
		A	Performs as F8 key.	
		a	Performs as F8 key.	
	Function mode	F	Changes input mode. Navigate to Numeric → Alphabet (uppercase) → Alphabet (lowercase)	

Table 2.5 Trigger keys

KEY	Input mode		Operation	Remarks
R Trigger	Character input mode	1	VK_OEM_RTR	
		A	VK_OEM_RTR	
		a	VK_OEM_RTR	
	Function mode	F	VK_OEM_RTR	
L Trigger	Character input mode	1	VK_OEM_LTR	
		A	VK_OEM_LTR	
		a	VK_OEM_LTR	
	Function mode	F	VK_OEM_LTR	
Trigger Center	Character input mode	1	VK_OEM_CTR	
		A	VK_OEM_CTR	
		a	VK_OEM_CTR	
	Function mode	F	VK_OEM_CTR	

Table 2.6 Ten key

KEY	Input mode		Operation	Remarks
0	Character input mode	1	Performs as 0 key.	
		A	Performs as “-_ / ^\&=+$%#* space” keys.	
		a	Performs as “-_ / ^\&=+$%#* space” keys.	
	Function mode	F	Displays SIP or does not display.	
1	Character input mode	1	Performs as 1 key.	
		A	Performs as “?!()<>[]{}” keys.	
		a	Performs as “?!()<>[]{}” keys.	
	Function mode	F	Turns on or off the backlight.	
2	Character input mode	1	Performs as 2 key.	
		A	Performs as “A”, ”B” and ”C” keys.	
		a	Performs as “a”, ”b” and ”c” keys.	
	Function mode	F	Darkens the contrast.	
3	Character input mode	1	Performs as 3 key.	
		A	Performs as “D“, ”E” and ”F” keys.	
		a	Performs as “d”, ”e” and ”f” keys.	
	Function mode	F	Brightens the contrast.	
4	Function mode	1	Performs as 4 key.	
		A	Performs as “G”, ”H” and ”I” keys.	
		a	Performs as “g”, ”h” and ”i” keys.	
	Function mode	F	Start the screen of Mouse Properties	
5	Character input mode	1	Performs as 5 key.	
		A	Performs as “J”, ”K” and ”L” keys.	
		a	Performs as “j”, ”k” and ”l” keys.	
	Function mode	F	Darkens the backlight.	
6	Character input mode	1	Performs as 6 key.	
		A	Performs as “M”, ”N” and ”O” keys.	
		a	Performs as “m”, ”n” and ”o” keys.	
	Function mode	F	Brightens the backlight.	

Continue.

7	Character input mode	1	Performs as 7 key.	
		A	Performs as “P”, ”Q”, ”R” and ”S” keys.	
		a	Performs as “p”, ”q”, ”r” and ”s” keys.	
	Function mode	F	Start the application.	
8	Character input mode	1	Performs as 8 key.	
		A	Performs as “T”, ”U” and ”V” keys.	
		a	Performs as “t”, ”u” and ”v” keys.	
	Function mode	F	Start the application.	
9	Character input mode	1	Performs as 9 key.	
		A	Performs as “W”, ”X”, ”Y” and ”Z” keys.	
		A	Performs as “w”, ”x”, ”y” and ”z” keys.	
	Function mode	F	Start the application.	
. (Decimal point)	Character input mode	1	Performs as “.” key.	
		A	Performs as “@.,””`:;~|” keys.	
		a	Performs as “@.,””`:;~|” keys.	
	Function mode	F	Performs as “-” key.	

Key Input Mode Switchover

The A (Fn+F8) key on the keyboard can be used to change the key input mode.

Indication of Key Input Mode

Key input mode currently specified appears in the title bar. The modes that can be displayed are “1” as numeral, “A” as alphabets in uppercase letter, and “a” as alphabets in lowercase letter.

Figure 2.2

Turnover Key Auto Confirmation

After pressing a turnover key, if the preset time period has been elapsed from the time when the turnover key is released, the turnover character input will be automatically made. The Control Panel can be used to set up “Enable” or “Disable” for the auto confirmation on the turnover character input and to set up the time period until when its confirmation is made.

Key Repeat

Continuously pressing of any of the “0” to “9”, “ ↑“, “←”, “→” and “ ↓“ keys repeats the key input.

Key Click Sound

The key click sound is generated when a key is pressed. However, it is not generated when the key is released or in mid-course of repeating the key input. The Control Panel can be used to set up the sound to mute, low or loud.

Enabling or Disabling Fn Key

For keys that perform specialized operations while the key input mode has been set to Function mode, “Enable” or “Disable” can be set on each individual key in the registry below to control the operations.

[HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD]

Or, using the **SysSetFnKeyOperation** function of the System Library can achieve the same control operation explained above.

Table 2.7

Key	Setting Value	Meaning
DisableFn9	dword: 0 or 1	Enable or Disable
DisableFn8	dword: 0 or 1	Enable or Disable
DisableFn7	dword: 0 or 1	Enable or Disable
DisableFn6	dword: 0 or 1	Enable or Disable
DisableFn5	dword: 0 or 1	Enable or Disable
DisableFn4	dword: 0 or 1	Enable or Disable
DisableFn3	dword: 0 or 1	Enable or Disable
DisableFn2	dword: 0 or 1	Enable or Disable
DisableFn1	dword: 0 or 1	Enable or Disable
DisableFn0	dword: 0 or 1	Enable or Disable

The functions of the System Library relevant to the “Enabling or Disabling Fn Key” are as follows.

SysSetFnKeyOperation : Sets up “Enable” or “Disable” for the Fn key operation.
SysGetFnKeyOperation : Retrieves “Enable” or “Disable” status for the Fn key operation.

Function Mode Notification

When the Fn key is pressed, the WM_USER+0x502 message is issued to application. This enables the application to detect whether the Function mode has been set up enabled or disabled.

Enable or Disable the A Key

The System Library can be used to make the setting on “Enable” or “Disable” for switching over the key input mode in application.

The functions of the System Library relevant to the “Enable or Disable the A Key” are as follows.

SysSetFnKeyLock : Sets up “Enable” or “Disable” for the Fn key to activate.
SysGetFnKeyLock : Retrieves “Enable” or “Disable” status for the Fn key to activate.

A Key Notification

When the A key is pressed, the WM_USER+0x506 message is issued to application. Using this notification, the application can detect whether the key input mode has been changed.

Permit or Prohibit Key Locks

The System Library can be used to permit or prohibit the operations of keys except for the Power and Trigger keys.

The functions of the System Library relevant to the “Permit or Prohibit Key Locks” are as follows.

SysSetAllKeyLock : Sets up “Enable” or “Disable” for lock with specified key.
SysGetAllKeyLock : Retrieves “Enable” or “Disable” status for lock with specified key.

User Settable Keys

Initiating application
The following registry can be used to assign any application to the Fn+7, Fn+8 and Fn+9 keys.

[HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD]

Table 2.8

Key	Setting Value
Fn7LaunchPath	sz: Target application in full path to initiate
Fn8LaunchPath	sz: Target application in full path to initiate
Fn9LaunchPath	sz: Target application in full path to initiate

- Setting Key Codes

The System Library can be used to assign any key code to all the keys except the Fn key. Setting “Enable” or “Disable” for assigning key code is possible using the System Library or at the Control Panel.

The functions of the System Library relevant to the “Setting Key Codes” are as follows.

SysSetNormalUserDefineKey : Sets up key codes (in normal mode).
SysGetNormalUserDefineKey : Retrieves key codes (in normal mode).

- The key codes after setting are valid only when the numeral input mode is set enabled.

2.1.5 Audio

Basic Specifications

WAV playback, voice recording and playback are supported.
By using the Microsoft **SoftwareMixer** function, output sounds from multiple applications can be mixed and output (in 44.1 KHz, 16-bit stereo mixing).
Voice Recorder is integrated in the terminal as the sound system application to make it possible to perform WAV file streaming playback and local file playback in HTTP.
Audio and Buzzer use the same integrated speaker, therefore it is not possible to playback Audio and Buzzer sound at the same time. In this case, Buzzer sound has the priority.

Playback

Table 2.9

Sampling frequencies	KHz	8	11.025	12	16	22.05	24	32	44.1	48
	Mono	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Stereo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Sampling frequencies other than those above are not supported.									
Stereo/Monaural	8-bit or 16-bit In reality, the integrated monaural speaker does not output sound in stereo.									

Recording

Table 2.10

Sampling frequencies	KHz	8	11.025	12	16	22.05	24	32	44.1	48
	Monaural	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Sampling frequencies other than those above are not supported.									
Stereo/Monaural	8-bit or 16-bit Monaural sound input only via the microphone.									

Setting Sound Volume

The Control Panel can be used to set up sound volume in six grades from loud to low and ON/OFF of mute. A sound volume also can be set up using **Win32 API** function in application.

Audio ON/OFF

The audio system can be disabled to save the power. “Enable” or “Disable” for the audio system in the terminal is controlled using the System Library in application.

The functions of the System Library relevant to the Audio ON/OFF are as follows.

SysAudioOff : Turns off the audio virtually with the audio turned off.
SysAudioOn : Turns on the audio virtually with the audio turned on.
SysGetAudioPowerState : Retrieves “Enable” or “Disable” status for turning off the audio virtually.

2.1.6 Buzzer Sounds

Basic Specifications

The buzzer sound in various modes such as scanning confirmation, alarm, warning, and other available sounds can be output via the integrated speaker. The sounds have four attributes and default values.

Table 2.11

Sound Mode	Frequency (Hz)	Time (millisecond)	Individual Mute	Attribute
Alarm	3500	150	ON or OFF	B_ALARM
Warning	3000	100	ON or OFF	B_WARNING
Scan end	3300	75	ON or OFF	B_SCANEND
User designated	--	--	ON or OFF	B_USERDEF

Setting Volume

The Control Panel can be used to set up volume in three grades from loud, medium, low and ON/OFF of mute. Setting the volume is also possible using the System Library in application.

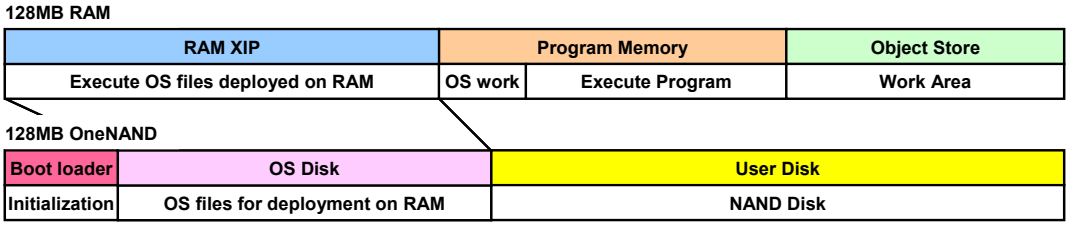
The functions of the System Library relevant to the Setting Volume are as follows.

SysPlayBuzzer : Sounds the buzzer.
SysStopBuzzer : Turns off the buzzer's sound.
SysSetBuzzerVolume : Sets up sound volume of the buzzer.
SysGetBuzzerVolume : Retrieves sound volume of the buzzer.
SysSetBuzzerMute : Sets up sound volumes for all the parameters and individual mutes.
SysGetBuzzerMute : Retrieves the statuses of all the sound volumes and individual mutes.

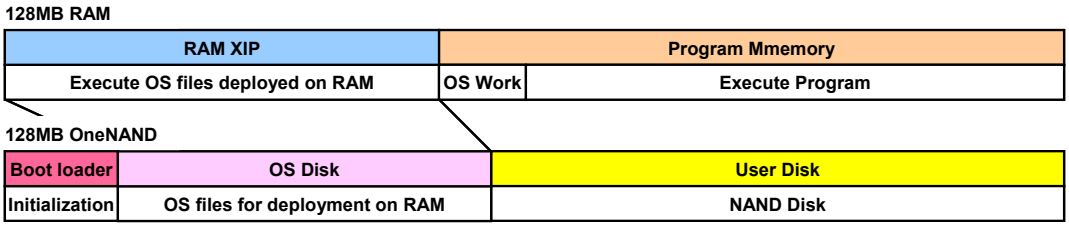
2.1.7 Memory Management

The high speed and large capacity RAM (MobileDDR 128MB) and FlashDisk (NAND Flash 128MB) are integrated in the terminal.
Although RAM has been used for RAM XIP (for OS), program memory (for program files) and object store (for work area) in the past, it is unified presently to integrate FlashDisk on root folder.

Before



Windows CE models



Windows Mobile models

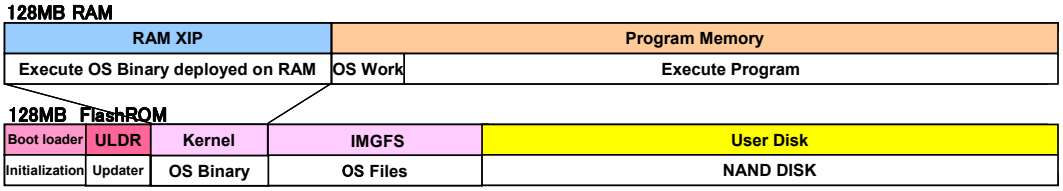


Figure 2.3

Notes:

- Patch files, program files and data are not lost even if the battery pack runs down. Thanks to this, it is no longer needed to back up object store in the RAM.
- Although object store (RAM) is initialized by a full reset in the past, the functions to clear OS and reload it are supplied.
- If user disk is formatted, registry, program files and data are initialized to the factory defaults respectively prior to shipment.
- Although the folder named FlashDisk keeps the compatibility, it is not possible to format this folder.

RAM

The integrated RAM has a total capacity of 128 MB and is used for the below purposes.

- Driver glob and buffer : Work area for driver and so on.
- OS area : Area to carry out deployed OS.
- Program memory : Memory area to carry out program and for the OS work area.

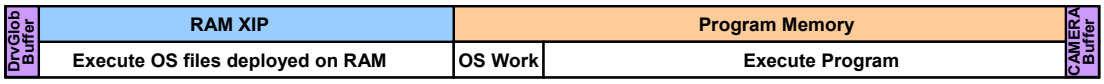


Figure 2.4

- The **DriverGlob** is allocated for the work area of drivers. The camera buffer used in the terminal for the integrated digital camera deploys camera data temporarily on taking images. The OS files are deployed from FlashDisk to RAM, and work in the RAM quickly.
- It takes time to deploy the OS files from the FlashDisk to the RAM on clearing OS, reloading and booting after the battery pack run down.
- There is not object store corresponded to RAM disk. Due to that, if the files are copied into root/Windows folder under “My device” folder, data files are stored without back-up operation even if the battery pack runs down because files are created on user disk of FlashDisk actually.
- A full reset (all memory clear) to delete object store like before is not provided. Instead, the functions (see Chapter 2.1.8) to clear the OS and reload are made available. Because of this reason, it is not possible to change the ratio of program memory and object store in the control applet.

FlashDisk

The FlashDisk has 128MB as its total capacity and is used for the following purposes.

- Boot area : Boot Loader which loads the OS to RAM is stored here.
- OS disk : OS files are stored. Boot loader deploys OS files in the RAM during booting.
- User disk : User can use freely as disk.

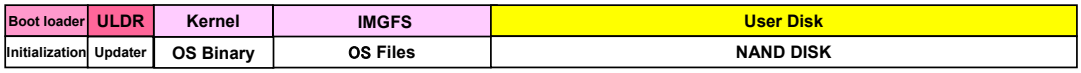


Figure 2.5

- In the boot area, boot loader and etc. are stored to deploy OS files in the RAM.
- In the OS disk, internal application and etc. are stored.
- The FlashDisk different from RAM does not require a power to back up data in the disk, so data is not lost even if the terminal’s memory backup battery is exhausted.
- It is not necessary to back up object store like before because the FlashDisk is mounted on root folder below “My Device”.
- Pay attention when user disk is formatted (see note), because registry, patch files, program files and data are deleted and then initialized to the factory defaults respectively.

Note:
Formatting is carried out by an exclusive tool on the control applet and special key operation. See the next chapter concerning the special key operation.

2.1.8 Reset

The role of the boot loader in Windows Mobile (OAL) (see Figure 2.6) is to boot the OS after initializing the hardware. On the terminal, it is possible to carry out the inspection tool and OS update tool with special key operation as described in the respective figures below.

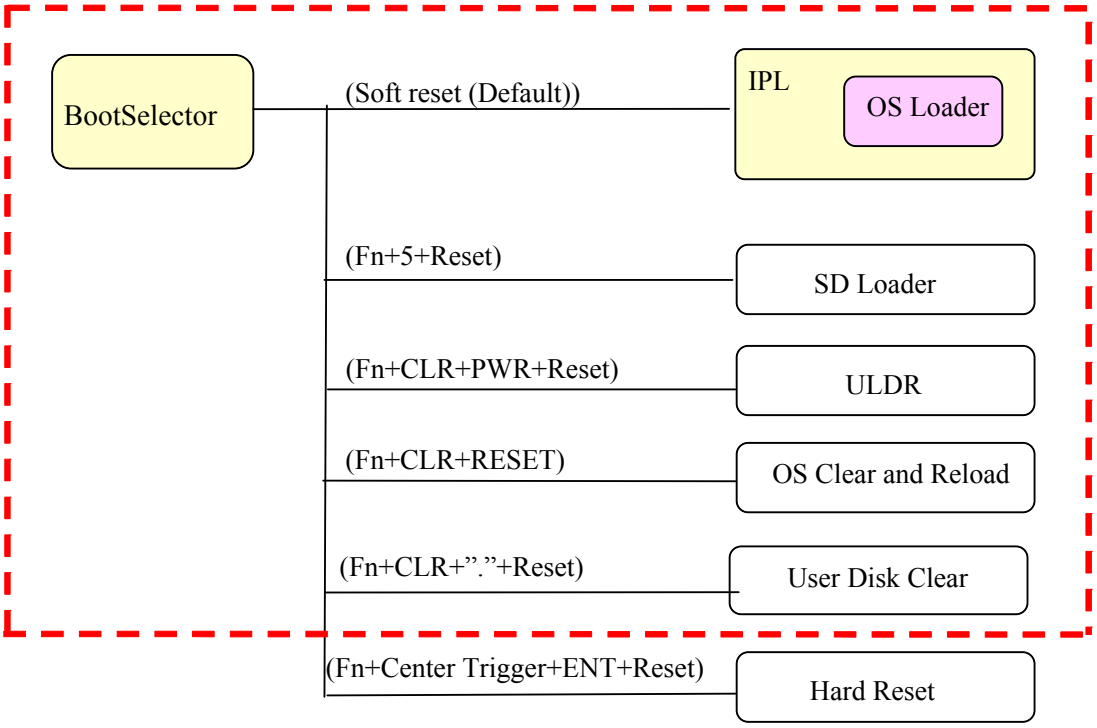


Figure 2.6 Windows Mobile

To reset the terminal, there are several ways to carry out. The explanation below describes the methods to reset the terminal.

Soft Reset

The operation requires pressing the reset switch on the back of the terminal. It initializes the program memory.

OS Clear and Reload

This operation is carried out if Fn and CLR keys are held down at the same time and then the reset switch is pressed down. It initializes the RAM and reloads the OS again from the OS disk.

Hard Reset

This operation is carried out if Fn, Center Trigger and ENT keys are held down at the same time and then the reset switch is pressed down. The RAM and Clock (RTC) are initialized and then the system restarts.

User Disk Clear

This operation is carried out if Fn and CLR and "." keys are held down at the same time and then the reset switch is pressed for a period of one second or longer while the terminal is in operation. A message (see Figure 2.7) to confirm memory initialization appears. The R Trigger key is used to confirm the User Disk Clear.

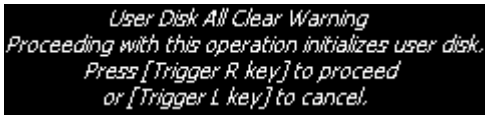

User Disk All Clear Warning
Proceeding with this operation initializes user disk.
Press [Trigger R key] to proceed
or [Trigger L key] to cancel.

Figure 2.7

After the R Trigger key is pressed twice, User disk is formatted and RAM are initialized to the factory condition (see note).

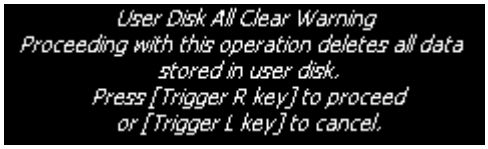

User Disk All Clear Warning
Proceeding with this operation deletes all data
stored in user disk.
Press [Trigger R key] to proceed
or [Trigger L key] to cancel.

Figure 2.8

Notes:

- Distributor ID is not cleared.
- The utility to carry out the **User Disk Clear** is available. See "DSKClean" for detail.

Power-on Reset

After the battery pack and memory backup battery are demounted and then put back into the terminal, this state occurs when the Power switch is turned on for the first time. When the Power switch is turned on in this state, the Boot Loader performs the reset (RTC is initialized if it is necessary).

Table 2.12

	RAM		FlashDisk	Clock (RTC)	EEPROM	
	OS Memory	Program Memory			Individual ID	Distributor ID
Soft Reset	No	Initialized	No	No	No	No
OS Clear, Reload	Reloaded	Initialized	No	No	No	No
Hard Reset	Reloaded	Initialized	No	Initialized	No	No
User Disk Clear	Reloaded	Initialized	Initialized	No	No	No
Power-on Reset	Reloaded	Initialized	No	No/Initialized	No	No
SD Loader	Reloaded	Initialized	No	No	No	No
ULDR	Reloaded	Initialized	No	No	No	No

Note:
"No" in the table indicates that the content in the memory is not initialized by the reset method.

2.1.9 Memory Corruption Check

To confirm checksum is carried out in order to detect whether the OS deployed in the memory is corrupted or not, and the OS is reloaded if it is necessary.

Table 2.13

	Confirm the checksum	OS load
On Soft Reset	Carried out	Carried out when error of check-sum occurs.
On OS Clear, Reload, Hard Reset, User Disk and Power-on Reset	-	Carried out
On Suspend and Resume	None	None

Notes:

- The reason to confirm whether the checksum is not carried out on suspending and resuming is for high-speed performance. But memory corruption check is done in order to confirm whether RAM is in the error status by any reasons or not.
- This writes down fixed data (0x00 to 0xFF) previously into fixed area (256 bytes area) on the RAM, and compares the value on resuming. When error is detected, warning message for memory corruption check is issued, and then reset is performed.

2.1.10 LED

Basic Specifications

There are two LEDs integrated in the terminal, one on the right side for the user notifications and the other for charging the battery complete notification.

Table 2.14

LED	Color	Description
Right side LED	Red	User notification (alarm), scanning a bar code
	Green	Scanning a bar code
	Blue	Connection established via Bluetooth
	Orange	Connection established via WLAN, WWAN or GPS
	Cyan	User defined
	Magenta	User defined
Left side LED	Orange	While charging battery pack.
	Green	Charging battery pack is complete.
	Red	Charging Error.

Notes:

- The user notification LED (Indicator #2) on the right side can be used to indicate various notifications by the OS and other notifications defined by the user.
- All colors available in the LED (Indicator #2) on the right side are indicated with the System Library.
- The charging battery complete LED (Indicator #1) on the left side cannot be controlled or manipulated for its ON/OFF state and color with software.

User Notification (Alarm)

This indication mode is used for alarm notification and etc. The LED can be lit for a specific time with **CeSetUserNotification()API** function.

Table 2.15

Operating mode	Specification
Blink interval	ON in red for 1 second, OFF for 2 seconds
Continuous ON time	ON for 30 minutes (OFF when VDET is detected.)

Note:
Indication for scanning a bar code has the priority over other indications.

Scanning

This is used for notification of a scanning result which is controlled with the System Library.

Table 2.16

Operating mode	Specification	Attribute
Scanning complete	ON in green for a specified period of time, then OFF.	L_SCANOK
Scanning in error	ON in red for a specified period of time, then OFF.	L_SCANERR

Bluetooth Connection Status

This is used for notification of Bluetooth connection establishment status which is controlled with the System Library.

Table 2.17

Operation mode	Specification	Attribute
Bluetooth established	ON in blue for 1 second, OFF for 2 seconds	L_BT

Note:
Indication for scanning a bar code has the priority over other indications.

WLAN Connection Status

This is used for notification of WLAN connection establishment status which is controlled with the System Library.

Table 2.18

Operation mode	Specification	Attribute
WLAN established	ON in orange for 1 second, OFF for 2 seconds	L_WLAN

Note:
Indication for scanning a bar code has the priority over other indications.

User Definition

This indication mode is used for other notifications freely defined by the user. The ON/OFF state and color to be lit can be controlled with the System Library.

Table 2.19

Operation mode	Specification
User definition	Color selection from red, green, blue, orange, cyan and magenta.
	Programmable for ON and OFF time periods
Continuous ON time period	30 minutes (OFF when VDET is detected)

Note:
Indication for scanning a bar code has the priority over other indications.

The functions of the System Library relevant to the User Definition are as follows.

SysSetLED : Sets up “Enable” or “Disable” for turning on the LED.
SysGetLED : Retrieves “Enable” or “Disable” status for turning on the LED.

WWAN Connection Status

This is used for notification of WWAN connection establishment status.

Table 2.20

Operation mode	Specification	Attribute
WWAN established	ON in orange for 1 second, OFF for 2 seconds	L_WWAN

Notes:

- Indication for scanning a bar code has the priority over other indications.
- User access is supported by the System Library (**CLBSetIndicator** function).
- The color of indications for WLAN, WWAN and GPS is the same.

GPS Connection Status

This is used for notification of GPS connection establishment status.

Table 2.21

Operation mode	Specification	Attribute
GPS established	ON in orange for 1 second, OFF for 2 seconds	L_GPS

Notes:

- Indication for scanning a bar code has the priority over other indications.
- User access is supported by the System Library (**CLBSetIndicator** function).
- The color of indications for WLAN, WWAN and GPS is the same.

2.2 Laser Scanner

This chapter describes about detailed specifications of the integrated Laser Scanner (model dependant).

2.2.1 Basic Specifications

The following industrial standard bar code symbologies are supported by the integrated Laser Scanner.

Table 2.22 Supported symbologies

Symbology	Check Digit Calculation	No. of min. digits	No. of max. digits
EAN, UPC-A, UPC-B	Enable or Disable	8 (fixed)	13 (fixed)
EAN, UPC-A, UPC-B Addon	Enable or Disable	10 (fixed)	18 (fixed)
UPC-E	Enable or Disable	7 (fixed)	7 (fixed)
UPC-E Addon	Enable or Disable	9 (fixed)	12 (fixed)
Code39	Enable or Disable	2 (Note 3)	52
NW7	Enable or Disable	2 (Note 4)	63
Interleaved 2of5	Enable or Disable	4 (Note 5)	94
Industrial 2of5	Enable or Disable	2	67
Code93	Enable or Disable	1	70
Code128	Enable or Disable	1	98
MSI	Enable or Disable (Note 1)	1	57
IATA	Enable or Disable (Note 2)	1 (Note 6)	65 (Note 6)
RSS-14 (Note 8)	Enable	14 (fixed)	14 (fixed)
RSS Limited (Note 8)	Enable	14 (fixed)	14 (fixed)
RSS Expanded (Note 8)	Enable	1	74 (Note 7)
RSS-14 Stacked (Note 8)	Enable	14 (fixed)	14 (fixed)
RSS Expanded Stacked (Note 8)	Enable	1	74 (Note 7)

Notes:

3. MSI check digit

   One of the following MSI check digit calculation methods can be selected.

   - 1 digit, mod10
   - 2 digit, mod10/mode11
   - 2 digit, mod10/mod10

4. IATA check digit

   One of the following IATA check digit calculation methods can be selected.

   - Calculate number other than end 1 digit
   - Calculate coupon number and numeric value segment
   - Calculate numeric value segment
   - mod10

5. Minimum digit on Code39 symbology

   The no. of minimum digits can be set to one digit only when scanning Code39 symbology is enabled.

6. Minimum digit on NW7 symbology
   The no. of minimum digits can be set to one digit only when scanning NW7 symbology is enabled.
7. Minimum digit on Interleaved 2of5 symbology
   The no. of minimum digits can be set to two digits only when scanning Interleaved 2of5 symbology is enabled.
8. Minimum and maximum digits on IATA symbology
   The no. of minimum digits can be set to 15 digits or 17 digits for the maximum only when the IATA check digit calculation is set to “Coupon number and Calculate data segment” or “Calculate just data segment”.
9. The maximum digit count for just numeric data is 74 digits, or the maximum digit count for just alphabet data is 41 digits.
10. The RSS symbologies change its name to GS1 DataBar.
    - RSS-14 → GS1 DataBar Omnidirectional
    - RSS Limited → GS1 DataBar Limited
    - RSS Expanded → GS1 DataBar Expanded
    - RSS-14 Stacked → GS1 DataBar Stacked
    - RSS Expanded Stacked → GS1 DataBar Expanded Stacked

Check Digit Calculation

A bar code value is calculated in accordance with method, and then the calculation result and the check character at a specific position are compared. If they match each other, the scanning data is deemed correct. The calculation method differs according to each symbology.

Readable Digits

The actual readable digit on a bar code differs depending on the resolution and the scanning distance between the terminal and the bar code.

2.2.2 Scanning Method

The Laser Scanner has “scanning state” (emits laser beam to read a bar code) and “standby state” (scanning is halted and in standby state). These two states are controlled to start scanning bar code and stop the scanning.

Table 2.23 Scanning methods

Scan method	Description	Conditions for scanning to end	Timeout Yes or No
Single scan	Press Trigger key to start scanning. Scanning is stopped when either scanning is succeeded or one of the scan end conditions (right side) is met.	• Timeout time has elapsed. • **OBRClose** function is called.	Yes
Continuous scan (controlled with Trigger key)	Press Trigger key to start scanning, and scanning will continue as long as the Trigger key is held down. Scanning will stop when either scanning is completed for just preset no. of times for scanning or one of the scan end conditions (right side) is met.	• Timeout time has elapsed after scanning a bar code. • Scanning for the number of preset times is complete. • The Trigger key is released. • **OBRClose** function is called.	Yes
Continuous scanning (controlled by program)	Scanner library functions are used to start and stop scanning. The previous scanning data and scanning data overlapped with other scanning data will be disregarded. Also, to save the power during scanning, emitting laser beam will be turned off between laser emissions. (note 2)	• Timeout time has elapsed after scanning the precious scanning. • Scanning end function is called while scanning continues. • **OBRClose** function is called.	Yes

Notes:

1. The scanning method set by default is with “Continuous scanning (controlled with Trigger key)” and “No. of preset times for continuous scanning = 1”.
2. In condition where the parameter in the registry has been set, performing a full reset on the terminal makes emitting the laser beam is turned off intermittently between laser emissions possible.

   The path of the registry is as follows.
   Path : HKEY_LOCAL_MACHINE\Drivers\CASIO\Laser
   Data-type : DWORD
   Parameter : ScnBlk (1: valid, 0: invalid)

The functions of the Laser Scanner Library relevant to the Scanning Method are as follows.

OBRStartScanning	:	Emits laser beam and start scanning a bar code.
OBRStopScanning	:	Stops emitting laser beam and scanning a bar code.
OBRSetScanningType	:	Sets up scanning mode.
OBRGetScanningType	:	Retrieves the scanning mode.
OBRClose	:	Sets up scanning disable status.
OBRSetScanningCounter	:	Sets up the no. of times for continuous scanning.
OBRGetScanningCounter	:	Retrieves the no. of times for continuous scanning.
OBRSetScanningTimeout	:	Sets up a time period of timeout for scanning complete.
OBRGetScanningTimeout	:	Retrieves timeout of scanning complete.

Multi-step Scanning

This method is for scanning a designated number of bar codes. Once scanning for the designated number of bar codes has been completed, the scanner closes and not scan again until reopened. Also, the same bar codes that have been scanned previously cannot be scanned again.

The functions of the Laser Scanner Library relevant to the Multi-step Scanning are as follows.

OBROpen	:	Sets up scanning enable status.
OBRClose	:	Sets up scanning disable status.
OBRSetScanningCounter	:	Sets up the no. of times for continuous scanning.
OBRGetScanningCounter	:	Retrieves the no. of times for continuous scanning.
OBRSetMultiStepReading	:	Sets up the no. of bar codes to scan in multi-step scanning mode.
OBRGetMultiStepReading	:	Retrieves the no. of bar codes to scan in multi-step scanning mode.

2.2.3 Scanning Parameters

Conditions that allow scanning a symbology in a specific mode can be set for each readable symbology.

Readable Symbology

Bar code symbologies that are enabled or disabled for scanning can be specified. If only specific symbologies are to be scanned, set “Enable” for scanning on these symbologies only and “Disable” on the other symbologies. This educes decode processing time and lowers the error rate. The default is “Enable scanning on all the symbologies”.

Readable Digits

The no. of readable digits can be set for each symbology. If only specific no. of digits is to be scanned, specify it for each readable symbology. This reduces decode processing time and lowers the error rate.

Enable or Disable Check Digit

Check digit can be set to “Enable” or “Disable” for each readable symbology. Setting the check digit lowers the error rate.

Table 2.24

Symbology	Check Digit Calculation	Default
EAN, UPC-A, UPC-B	Enable or Disable	Enable
EAN, UPC-A, UPC-B Addon	Enable or Disable	Enable
UPC-E	Enable or Disable	Enable
UPC-E Addon	Enable or Disable	Enable
Code39	Enable or Disable	Disable
NW7	Enable or Disable	Disable
Interleaved 2of5	Enable or Disable	Enable
Industrial 2of5	Enable or Disable	Enable
Code93	Enable or Disable	Enable
Code128	Enable or Disable	Enable
MSI	Enable or Disable	Enable
IATA	Enable or Disable	Disable
RSS-14 (note)	Enable	Enable
RSS Limited (note)	Enable	Enable
RSS Expanded (note)	Enable	Enable
RSS-14 Stacked (note)	Enable	Enable
RSS Expanded Stacked (note)	Enable	Enable

Note:

The RSS symbologies change its name to “GS1 DataBar”.

RSS-14 → GS1 DataBar Omnidirectional

RSS Limited → GS1 DataBar Limited

RSS Expanded → GS1 DataBar Expanded

RSS-14 Stacked → GS1 DataBar Stacked

RSS Expanded Stacked → GS1 DataBar Expanded Stacked

The functions of the Laser Scanner Library relevant to the Scanning Parameters are as follows.

OBRSetScanningCode	:	Sets up scanning with individual bar code symbology.
OBRGetScanningCode	:	Retrieves scanning status with individual bar code symbology.
OBRSetCode39Option	:	Sets up scanning with Code39 symbology.
OBRGetCode39Option	:	Retrieves decode options of Code39 symbology.
OBRSetNW7Option	:	Sets up scanning with NW-7 symbology.
OBRSetNW7OptionEx	:	Sets up scanning with NW-7 symbology.
OBRGetNW7Option	:	Retrieves decode options of NW-7 symbology.
OBRSetWPCAddonOption	:	Sets up scanning with WPC Addon symbology.
OBRSetWPCAddonOptionEx	:	Sets up scanning with WPC Addon symbology.
OBRGetWPCAddonOption	:	Retrieves decode options of WPC Addon symbology.
OBRSetWPCOption	:	Sets up scanning with WPC symbology.
OBRSetWPCOptionEx	:	Sets up scanning with WPC symbology.
OBRGetWPCOption	:	Retrieves decode options of WPC symbology.
OBRSetUPCEAddonOption	:	Sets up scanning with UPC-E Addon symbology.
OBRSetUPCEAddonOptionEx	:	Sets up scanning with UPC-E Addon symbology.
OBRGetUPCEAddonOption	:	Retrieves decode options of UPC-E Addon symbology.
OBRSetUPCEOption	:	Sets up scanning with UPC-E symbology.
OBRSetUPCEOptionEx	:	Sets up scanning with UPC-E symbology.
OBRGetUPCEOption	:	Retrieves decode options of UPC-E symbology.
OBRSetIDFOption	:	Sets up scanning with Industrial 2of5 symbology.
OBRGetIDFOption	:	Retrieves decode options of Industrial 2of5 symbology.
OBRSetITFOption	:	Sets up scanning with ITF (Interleaved 2of5) symbology.
OBRGetITFOption	:	Retrieves decode options of ITF (Interleaved 2of5) symbology.
OBRSetCode93Option	:	Sets up scanning with Code93 symbology.
OBRGetCode93Option	:	Retrieves decode options of Code93 symbology.
OBRSetCode128Option	:	Sets up scanning with Code128 symbology.
OBRGetCode128Option	:	Retrieves decode options of Code128 symbology.
OBRSetMSIOption	:	Sets up scanning with MSI symbology.
OBRGetMSIOption	:	Retrieves decode options of MSI symbology.
OBRSetIATAOption	:	Sets up scanning with IATA symbology.
OBRGetIATAOption	:	Retrieves decode options of IATA symbology.
OBRSetRSS14Option	:	Sets up scanning with RSS-14 symbology.
OBRGetRSS14Option	:	Retrieves decode options of RSS-14 Stacked symbology.
OBRSetRSSLimitedOption	:	Sets up scanning with RSS Limited symbology.
OBRGetRSSLimitedOption	:	Retrieves decode options of RSS Limited symbology.
OBRSetRSSExpandedOption	:	Sets up scanning with RSS Expanded symbology.

OBRGetRSSExpandedOption : Retrieves decode options of RSS Expanded symbology.
OBRSetRSS14StackedOption : Sets up scanning with RSS-14 Stacked symbology.
OBRGetRSS14StackedOption : Retrieves decode options of RSS-14 Stacked symbology.
OBRSetRSSExpandedStackedOption : Sets up scanning with RSS Expanded Stacked symbology.
OBRGetRSSExpandedStackedOption : Retrieves decode options of RSS Expanded Stacked symbology.

Validation

Validation is carried out for a specified number of times in the range of 1 to 9 (Default = 3) to check if scanned data is valid, and then the data is output. The number of validations can be set either at the Control Panel or using the Laser Scanner Library.

The functions of the Laser Scanner Library relevant to the Validation are as follows.
OBRSetCheckCounter : Sets up the no. of validations for decoding data.
OBRGetCheckCounter : Retrieves the no. of validations for decoding data.

No. of Scanning Times

In "Continuous Scanning" mode, scanning continues for the preset number of scanning times in the range of 1 to 9 (Default = 1) and then it will stop in waiting mode. The number of times for scanning can be set either at the Control Panel or using the Laser Scanner Library.

The functions of the Laser Scanner Library relevant to the "No. of Scanning Times" are as follows.
OBRSetScanningCounter : Sets up the no. of times for continuous scanning.
OBRGetScanningCounter : Retrieves the no. of times for continuous scanning.

Scanning Period

Valid time period of scanning in the range of 1 to 9 (Default = 3) seconds after Trigger key was pressed down can be set either at the Control Panel or using the Laser Scanner Library. After the preset time has elapsed, the scanner goes into standby mode waiting for the Trigger key to be pressed down again.

The functions of the Laser Scanner Library relevant to the Scanning Period are as follows.
OBRSetScanningTimeout : Sets up a time period of timeout for scanning complete.
OBRGetScanningTimeout : Retrieves the timeout of scanning complete.

Double Scanning Prevention

This prevents scanning the same bar code twice while the "Continuous Scanning" mode has been set. Scanning the same bar code again is prohibited while the scanning continues for the preset number of times. However, the bar code can be scanned again when the "Continuous Scanning" newly starts.

2.2.4 Scanning Output Format

Formats for outputting results of scanned bar codes can be set.

Table 2.25 Output Formats

Symbology	Standard	No. of digits	Output Format	Remark
WPC	JAN-13	13	FFMMMMMNNNNNCT	T : Termination code
	EAN-13	13	FFMMMMMNNNNNCT	
	JAN-8	8	FFMMMNCT	
	EAN-8	8	FFMMMNCT	See Table 2.26 for meaning of the notations.
	JAN-13 addon+2	15	FFMMMMMNNNNNCAAT	Excluding UPC-B, the mod10 check digit calculation is always performed
	EAN-13 addon+2	15	FFMMMMMNNNNNCAAT	
	JAN-13 addon+5	18	FFMMMMMNNNNNCAAAAAT	
	EAN-13 addon+5	18	FFMMMMMNNNNNCAAAAAT	
	JAN-8 addon+2	10	FFMMMMNCAAT	
	EAN-8 addon+2	10	FFMMMMNCAAT	
	JAN-8 addon+5	13	FFMMMMNCAAAAAT	
	EAN-8 addon+5	13	FFMMMMNCAAAAAT	
	UPC-A	12	0SMMMMMNNNNNCT	
	UPC-B	12	0SMMMMMNNNNNNT	
	UPC-A addon+2	14	0SMMMMMNNNNNCAAT	
	UPC-B addon+2	14	0SMMMMMNNNNNNAAT	
	UPC-A addon+5	17	0SMMMMMNNNNNCAAAAAT	
	UPC-B addon+5	17	0SMMMMMNNNNNNAAAAAT	
	UPC-A	12	SMMMMMNNNNNCT	
	UPC-A addon+2	14	SMMMMMNNNNNCAAT	
	UPC-A addon+5	17	SMMMMMNNNNNCAAAAAT	
	JAN-13	14	0FFMMMMMNNNNNCT	GTIN
	EAN-13	14	0FFMMMMMNNNNNCT	GTIN
	JAN-8	14	0000000FFMMMNCT	GTIN
	EAN-8	14	0000000FFMMMNCT	GTIN

Continue.

UPC-E (note 1)	UPC-A	14	00SMMMMMNNNNNCT	GTIN
	UPC-E	(7)/8	0MMNNNMCT	Last M: 0 to 2
		(7)/8	0MMMNN3CT	
		(7)/8	0MMMMN4CT	
		(7)/8	0MMMMMNCT	Last N: 5 to 9
		(6)/7	MMNNNMCT	Last M: 0 to 2
		(6)/7	MMMNN3CT	
		(6)/7	MMMMN4CT	
		(6)/7	MMMMMNCT	Last N: 5 to 9
	UPC-E	14	0000000MMNNNMCT	GTIN Last M: 0 to 2
		14	0000000MMMNN3CT	GTIN
		14	0000000MMMMN4CT	GTIN
		14	0000000MMMMMNCT	GTIN Last N: 5 to 9
	UPC-E addon+2	(9)/10	0MMNNNMCAAT	Last M: 0 to 2
		(9)/10	0MMMNN3CAAT	
		(9)/10	0MMMMN4CAAT	
		(9)/10	0MMMMMNCAAT	Last N: 5 to 9
		(8)/9	MMNNNMCAAT	Last M: 0 to 2
		(8)/9	MMMNN3CAAT	
		(8)/9	MMMMN4CAAT	
		(8)/9	MMMMMNCAAT	Last N: 5 to 9
	UPC-E addon+5	(12)/13	0MMNNNMCAAAAAT	Last M: 0 to 2
		(12)/13	0MMMNN3CAAAAAT	
		(12)/13	0MMMMN4CAAAAAT	
		(12)/13	0MMMMMNCAAAAAT	Last N: 5 to 9
		(11)/12	MMNNNMCAAAAAT	Last M: 0 to 2
		(11)/12	MMMNN3CAAAAAT	
		(11)/12	MMMMN4CAAAAAT	
		(11)/12	MMMMMNCAAAAAT	Last N: 5 to 9
Code39		3 to Max	SBBB -------- BBCST	See Table 2.27 for meaning of the notations
		3 to Max	SAAA ------- AACST	
		1 to Max	BBB ------- BBCT	
		1 to Max	AAA ------ AACT	
NW7		3 to Max	SDDD ------- DDDCST	See Table 2.28 for meaning of the notations
		1 to Max	DDD ------- DDDCT	
Interleaved 2of5		2 to Max	DDD ------- DDDCT	See Table 2.29 for meaning of the notations Only even number digits used for scanning readable digits.
Industrial 2of5		2 to Max	DDD ------ DDDCT	See Table 2.30 for meaning of the notations Only even number digits used for scanning readable digits.

Continue.

Code93		1 to Max	AAA ------ AAAT	See Table 2.31 for meaning of the notations
Code128	Code128	1 to Max	AAA ------ AAAT	See Table 2.32 for meaning of the notations
		1 to Max	SBBB ----- BBCST	
	EAN128 (note 3)	1 to Max	AAA ------- AAAT	See Table 2.33 for meaning of the notations.
		1 to Max	SBBB ------ BBCST	
		1 to Max	FAAA ------ AAAT	
		1to Max	GAAA ------ AAAT	
MSI		1 to Max	DDD ------ DDCCT	See Table 2.34 for meaning of the notations.
IATA		1 to Max	DDDDDDDDDD --------- CT	See Table 2.35 for meaning of the notations
			PADDDDDDDDDDDDDDCT	
RSS-14 (note 2)		16	01DDDDDDDDDDDDCT	See Table 2.36 for meaning of the notations.
		14	DDDDDDDDDDDDCT	
RSS Limited (note 2)		16	01DDDDDDDDDDDDCT	See Table 2.37 for meaning of the notations.
		14	DDDDDDDDDDDDCT	
RSS Expanded (note 2)		1 to74	DD ---- DDDT	See Table 2.38 for meaning of the notations.
		1 to 41	AA ---- AAAT	
RSS-14 Stacked (note 2)		16	01DDDDDDDDDDDDCT	See Table 2.36 for meaning of the notations.
		14	DDDDDDDDDDDDCT	
RSS Expanded Stacked (note 2)		1 to74	DD ---- DDDT	See Table 2.38 for meaning of the notations.
		1 to 41	AA ---- AAAT	

Notes:

1. "C" will not be appended to the output if the no. of scanning digits described in parentheses in the table above is applicable.
2. The RSS symbologies change its name to "GS1 DataBar".
   RSS-14 → GS1 DataBar Omnidirectional
   RSS Limited → GS1 DataBar Limited
   RSS Expanded → GS1 DataBar Expanded
   RSS-14 Stacked → GS1 DataBar Stacked
   RSS Expanded Stacked → GS1 DataBar Expanded Stacked
3. EAN-128 changes its name to "GS1-128".

Table 2.26 WPC symbology

F	Country flag
M	Manufacturer code
N	Product code
S	Number system character
A	Addon data
T	Termination code
C	Mod10 check digit

Table 2.27 Code39 symbology

A	ASCII conversion post data
B	ASCII conversion pre-data
C	Mod43 check digit. Becomes data if there is no check digit attached.
S	Start and stop characters

Table 2.28 NW7 symbology

S	Start and stop characters (any one of a, b, c and d)
D	Data
C	Mod16 check digit. Becomes data if there is no check digit attached.

Table 2.29 Interleaved 2of5 symbology

D	Data
C	Mod10 check digit. Becomes data if there is no check digit attached.

Table 2.30 Industrial 2of5 symbology

D	Data
C	Mod10 check digit. Becomes data if there is no check digit attached.

Table 2.31 Code93 symbology

A	ASCII conversion post data
B	ASCII conversion pre-data
C	Mod47 check digit. Becomes data if there is no check digit attached.
S	Start and stop characters

Table 2.32 Code128 symbology

A	ASCII conversion post data
B	ASCII conversion pre-data

Table 2.33 EAN128 symbology

C	Mod47 check digit
S	Start and stop characters
F	Code ID (only “]C1”, EAN128)
G	GS (only 1Dh, EAN128)

Table 2.34 MSI symbology

D	Data
C	Mo10 and Mod11 check digits. Becomes data when there is no check digit attached.

Table 2.35 IATA symbology

D	Data
C	Check digit (IATA). Becomes data when there is no check digit attached.
P	Coupon No
A	Airline No

Table 2.36 RSS-14 symbology

D	Numeric data
C	Mod10 check digit

Table 2.37 RSS Limited symbology

D	Numeric data
C	Mod10 check digit

Table 2.38 RSS Expanded symbology

D	Numeric data
A	Alphabet data

The functions of the Laser Scanner Library relevant to the "Scanning Output Formats" are those listed on page 39. See page 39.

Termination Codes

Choose one of the following five termination codes to attach to the end of decoded data.

- CR
- LF
- CR+LF
- TAB
- No termination code (default)

The functions of the Laser Scanner Library relevant to the Termination Codes are as follows.

OBRSetSuffixChar : Sets up suffix control code appended to decoding data.
OBRGetSuffixChar : Retrieves suffix control code appended to decoding data.

Output Buffer

The scanner scans a bar code and outputs the scanned data using one of the following methods described in the table.

Table 2.39

Output Method	Description
OBR buffer output (see note)	- Scanned data is output to memory in the Laser Scanner driver. - Scanned data already output to the memory can be captured using the Laser Scanner Library.
Key message output	- Scanned data can be output with the window message to the specified window handle. - The window handle is specified using the Laser Scanner Library.
Clipboard output	- Scanned result is copied to the clipboard and then output to the edit control focused by caret.
Keyboard output	- Scanned result is output as a keyboard event to the edit control focused by caret.

Note:
When a bar code is scanned, its decoded data including the symbology and data size are stored in the memory of the Laser Scanner driver. This output method has the following features.

- Capture the bar code symbology and data size.
- Capture the data at any timing the user prefers.
- The length of one piece of data is up to 98 characters (maximum) and up to 9 labels can be stored in the memory. If any new data scanned after exceeding over 9 labels stored already in the memory will be disregarded.

The functions of the Laser Scanner Library relevant to the Output Buffer are as follows.

OBROpen : Sets up scanning enable status.
OBRSetBuffType : Sets up decoding data output mode.
OBRGetBuffType : Retrieves decoding data output mode.
OBRGetc : Retrieves one character from OBR buffer.
OBRGets : Retrieves character string for one bar code from decoding data storage buffer.
OBRGetStatus : Retrieves OBR buffer status.
OBRClearBuff : Clears OBR buffer.

Conditions for Terminating Scanning

Scanning is terminated when any one of the following conditions is met.

- Scanning is succeeded.
- Preset timeout period has elapsed.
- OBR buffer becomes a full.
- An abnormal condition is detected in the scan module.

Scan Completion Notification

When scanning is complete, a notification is issued to the application using one of the methods described in the table. Each notification method can be set to either “Enable” or “Disable”. The default is “Notification with window message”.

Table 2.40

Method	Description
Window message	A window message is issued to the specified window handle. Also, the conditions for scanning completion can be retrieved by referring to ***wParam*** parameter of the window message.
Event	A predefined event in the registry is issued. The conditions of scanning completion can be retrieved using the Laser Scanner Library.
None	No message or event is issued when scanning is complete.

The functions of the Laser Scanner Library relevant to the “Scan Completion Notification” are as follows.

OBRSetScanningNotification : Sets up scanning complete notification.
OBRGetScanningNotification : Retrieves scanning complete notification.

Event Name

The predefined event name which is issued for event notification can be changed in the registry described below. If there is no value set in the registry, the default event name, **OBRScanningEvent**, is used.

[HKEY_LOCAL_MACHINE\Drivers\CASIO\Laser]

Table 2.41

Key Name	Setting Value
EventName	sz: Any name

Capturing Event Factors

When a notification for scanning completion is issued with “Event”, factors which made the scanning succeeded are automatically recorded. The recorded factors are also retrieved using the Laser Scanner Library.

The function of the Laser Scanner Library relevant to the “Capturing Event Factors” is as follows.

OBRGetLastEventStatus : Retrieves last event status.

Setting Specific Operation Unique to Code128 Symbology

The terminal supports specific operations unique to the Code128 symbology that are initiated when certain conditions are met at a time of scanning a symbol of the Code128 symbology.

Table 2.42

Symbology	Condition	Performance
Code128	At time of scanning a symbol of Code128 that includes the FNC2 function character.	Scanned symbol data including the FNC2 function character is temporarily stored in the scanner until when a next symbol is scanned. The stored data is automatically added at the forefront of the subsequent scanned symbol data to be output. (See note)
	At time of scanning a symbol of Code128 symbology that includes the FNC4 function character(s).	The value “128” is added automatically to a data character in ASCII of scanned symbol located next to the FNC4 function character. If two sequentially laid FNC4 function characters in a symbol are scanned, either other group of two sequentially laid FNC4 function characters within the same symbol are read, or “128” is added automatically to each subsequent ASCII character data laid next to the two FNC4 function characters until the last.

Note:
The size of combined symbol data including the FNC2 function character is limited to 98 characters (maximum). If the size of any combined symbol data exceeds the maximum number of characters, the previous combined symbol data that have been scanned right before the exceeded combined symbol data are output.

The functions of the Laser Scanner Library relevant to the “Setting Specific Operation Unique to Code128 Symbology” are as follows.

OBRSetCode128Option : Sets up scanning with Code128 symbology.
OBRGetCode128Option : Retrieves decode options of Code128 symbology.

2.2.5 Scan Result Notification

When scanning a bar code is complete, a notification about the scanning result can be indicated to the user via either LED or buzzer. Each indication method can be set to “Enable” or “Disable”.

Table 2.43

Indication method	Setting	When succeeded	When failed (note 1)	Scanning interrupted (Trigger key released)	OBR buffer full (note 2)	Default
LED	Mode 1	ON in green	None	None	ON in green	Mode 1
	Mode 2	ON in green	ON in red	None	ON in green	
	Mode 3 (Disable)	None	None	None	None	
Buzzer	Enable	Scan completion sound	None	None	Warning sound	Enable
	Disable	None	None	None	None	
	Disable	None	None	None	None	

Notes:

1. Scanning fails when one of the errors occurs.
   - A bar code with the number of digits which exceeds over the specified range is scanned.
   - Check digit calculation error occurs.
2. Full ASCII conversion error occurs in scanning bar code of Code39 symbology or Code128 symbology.
3. If the “OBR buffer output” method has been set effect as scanned data output method, the condition occurs if scanning takes place while data for 9 labels are stored already in the OBR buffer.

The functions of the Laser Scanner Library relevant to the “Scan Result Notification” are as follows.

OBRSetLED : Sets up LED notification.
OBRGetLED : Retrieves the status of LED notification.
OBRSetBuzzer : Sets up buzzer notification.
OBRGetBuzzer : Retrieves the status of buzzer notification.

2.2.6 Expanded Features

Scan Width Control

If the laser emits on several bar codes located near each other, scanning may fail. By narrowing the laser beam emission width, scanning can be focused onto only one bar code, not onto the other one located near by. The laser beam emission width can be set to one of the four modes as shown in following figure. The Laser Scanner Library can be used to set it. The default is “No control on laser beam emission width”.

- No control on laser beam emission width (default)
- Wide
- Standard
- Narrow

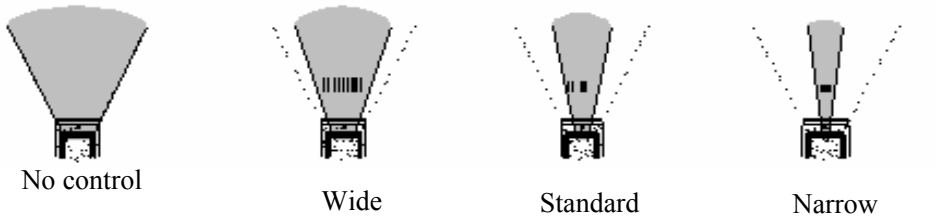


Figure 2.9

The setting values are stored in EEPROM, and read out at time of resetting. Laser calibration (see note below) can be used to adjust each setting value for the laser beam emission width. The setting values adjusted must be registered in the registry. The values in the registry will have the priority.

Note:
Each scanner module integrated in the terminal has an individual performance different from others. To minimize this characteristic difference, the laser calibration must be performed on each terminal using a dedicated reference bar code.

The functions of the Laser Scanner Library relevant to the “Scan Width Control” are as follows.

OBRSetSwingAngle : Sets up swing angle control mode.
OBRGetSwingAngle : Retrieves the status of swing angle control mode.

Scan Verification Beam

If scanning takes place with the laser beam emitted onto multiple bar codes located near each other, it is difficult to distinguish by the user which bar code was correctly scanned. In such the condition, if a laser beam can be emitted again on to the same bar code verifying the actual scanned bar code the user wishes to scan and a notification about it is issued to the user, the scanning can be succeeded without having any difficulty or confusion. The Laser Scanner Library can be used to set “Enable” or “Disable” for this Scan Verification Beam function. The default is “Disable the scan verification beam function”.

The functions of the Laser Scanner Library relevant to the “Scan Verification Beam” are as follows.

OBRSetFocus : Sets up the scan verification beam.
OBRGetFocus : Retrieves the status of the scan verification beam.

Power ON with Trigger Key

If a Trigger key has been set to “Enable turning on the power with Trigger key”, the power can be turned on (while the power was being turned off) when it is pressed. This function allows the user to achieve sequential operations with only one action, turn on the power → press Trigger key → scan a bar code. This feature is a perfect idea when the user wishes to resume scanning after the power has been turned off. The default is “Disable turning on the power with Trigger key”.

The functions of the System Library relevant to the “Power ON with Trigger Key” are as follows.

SysSetBootup : Sets up “Enable or Disable” for turning on power.
SysGetBootup : Retrieves “Enabled” or “Disable” status for turning on power.

Setting Trigger Key

Various keys such as Enter key, Cursor → key, Cursor ← key, Cursor ↑ key, Cursor ↓ key, R Trigger key, L Trigger key, and Center Trigger key on the front and sides of the terminal can be set as scanning trigger key. The default is only R/L Trigger keys and Center Trigger key.

The functions of the Laser Scanner Library relevant to the “Setting Trigger Key” are as follows.

OBRSetScanningKey : Sets up Trigger keys.
OBRGetScanningKey : Retrieves the status of Trigger keys.

Noise Filter

If the background of a bar code is white color, a noise tends to be generated easily during scanning causing the error rate to increase. To reduce such the noise, the Noise Filter function is available with the terminal. Two methods, software noise filter and ASIC noise filter, are available. However, the ASIC noise filter has been set always effect by the system. Thus, it is not possible for the user to reset it in the Read operation tab of Setting Scanner.

Table 2.44

Filter	Description	Merit	Demerit
Software noise filter	A software process removes noise. In determining the blank at the leading edge of the bar code, if there is a bar width smaller than a certain value, it will be bonded to the fore and aft data, the noise eliminated and the determination made. Also, the time in the range of 1 to 8 seconds from scanning to the time the software filter initiates can be set. The default is 3 seconds.	Effective when scanning leading edge blank of bar code using laser module noted for easily picking up noise.	If initial bar is extremely thin, it will be determined as noise and eliminated, which may mean that the bar code cannot be scanned.

The functions of the Laser Scanner Library relevant to the Noise Filter are as follows.

OBRSetFilter : Sets up noise filter mode.
OBRGetFilter : Retrieves noise filter mode.
OBRSetFilterOnTimer : Sets up start time for noise filter.
OBRGetFilterOnTimer : Retrieves start time for noise filter.

Setting Gain

The laser module gain setting, Mode 0 to Mode 3, can be selected. Selecting an optimum gain mode enhances scanning performance especially for bar code distanced far away from the terminal and bar code printed in high-resolution ("PCS").

Table 2.45

Gain Mode	Description
Mode 0	Standard mode This mode generates ordinary scanning performance for bar codes with various printing qualities and in various scanning conditions.
Mode 1	Low sensitive mode This mode enhances scanning performance for bar codes especially with low PCS. However, for bar codes with other PCS level, it is not recommended.
Mode 2	High sensitive mode This mode enhances scanning performance for bar codes distanced far away from the terminal. However, for bar codes distanced near by the terminal the performance is relatively inferior.
Mode 3	Super sensitive mode This mode enhances scanning performance for bar codes with thin white bars or black thin bars or stained bars. For other conditions, it is not recommended.

The functions of the Laser Scanner Library relevant to the Setting Gain are as follows.

OBRSetGainControl : Sets up gain control.
OBRGetGainControl : Retrieves gain control.

Configuration File

The various setting values can be stored in a file and resumed. The setting file storage location and its name are "\Documents and Settings\System Settings\OBRDRV.ini". If there is no such the setting file, the default values are used to initiate the scanning.

Table 2.46

Symbology	Parameter	Description	Range	Default	Setting	
Readable Bar Code	READCODE	Enable or disable scanning the symbologies. (note 1)	1	131071	1:	Enable Code39
			2		2:	Enable NW-7
			4		4:	Enable WPC Addon
			8		8:	Enable WPC
			16		16:	Enable UPC-E Addon
			32		32:	Enable UPC-E
			64		64:	Enable IDF
			128		128:	Enable ITF
			256		256:	Enable Code93
			512		512:	Enable Code128
			1024		1024:	Enable MSI
			2048		2048:	Enable IATA
			4096		4096:	Enable RSS-14 (note 5)
			8192		8192:	Enable RSS Limited (note 5)
			16384		16384:	Enable RSS Expanded (note 5)
			32768		32768	Enable RSS-14 Stacked (note 5)
			65536		65536	Enable RSS Expanded Stacked (note 5)
CODE 39 Option	CODE39_MIN	Valid minimum digits	2	2		
	CODE39_MAX	Valid maximum digits	52	52		
	CODE39_OUTFORMAT	Output format	0	0	0:	Output Code39 bar code with start and stop characters.
			1		1:	Output Code39 bar code without start and stop characters.
			2		2:	Output Code39 bar code after Full ASCII conversion and with start and stop characters.
			3		3:	Output Code39 bar code after Full ASCII conversion and without start and stop characters.

Continue.

	CODE39_CHKD	Check digit calculation	0	0	0:	Disable
			1		1:	Enable
	CODE39_CHKCH	Check character output	0	1	0:	Disable
			1		1:	Enable
NW 7 Option	NW7_MIN	Valid minimum digits	2	2		
	NW7_MAX	Valid maximum digits	63	63		
	NW7_OUTFORMAT	Output format	0	0	0:	Output NW7 bar code with start and stop characters.
			1		1:	Output NW7 bar code without start and stop characters.
	NW7_CHKD	Check digit calculation	0	0	0:	Disable
			1		1:	Enable
	NW7_CHKCH	Check character output	0	0	Disable (fixed)	
WPC Addon Option	WPCADDON_MIN	Valid minimum digits	10	10	Fixed	
	WPCADDON_MAX	Valid maximum digits	18	18	Fixed	
	WPCADDON_OUTFORMAT	Output format	0	0	0:	Output WPC Addon bar code with “0” at the forefront.
			1		1:	Output WPC Addon bat code without “0” at the forefront.
	WPCADDON_CHKD	Check digit calculation	0	1	0:	Disable
			1		1:	Enable
	WPCADDON_CHKCH	Check character output	1	1	Enable (fixed)	
WPC Option	WPC_MIN	Valid minimum digits	8	8	Fixed	
	WPC_MAX	Valid maximum digits	13	13	Fixed	
	WPC_OUTFORMAT	Output format	0 1 14	0	0: Output WPC bar code with “0” at the forefront. 1: Output WPC bar code without “0” at the forefront. 14: Output WPC bar code in GTIN format.	
	WPC_CHKD	Check digit calculation	0	1	0:	Disable
			1		1:	Enable
	WPC_CHKCH	Check character output	1	1	Enable (fixed)	
UPC-E Addon Option	UPCEADDON_MIN	Valid minimum digits		9	Fixed	
	UPCEADDON_MAX	Valid maximum digits		12	Fixed	
	UPCEADDON_OUTFORMAT	Output format		0	0:	Output UPCE Addon bar code with “0” at the forefront.
					1:	Output UPCE Addon bar code without “0” at the forefront.

Continue.

	UPCEADDON_CHKD	Check digit calculation		1	0:	Disable
					1:	Enable
	UPCEADDON_CHKCH	Check character output		1	0:	Disable
					1:	Enable
UPC-E Option	UPCE_MIN	Valid minimum digits	7	7	Fixed	
	UPCE_MAX	Valid maximum digits	7	7	Fixed	
	UPCE_OUTFORMAT	Output format	0 1 2	0	0: Output UPC-E bar code with "0" at the forefront. 1: Output UPC-E bar code without "0" at the forefront. 2: Output UPC-E bar code in GTIN format.	
	UPCE_CHKD	Check digit calculation	0	1	0:	Disable
			1		1:	Enable
	UPCE_CHKCH	Check character output	0	1	0:	Disable
			1		1:	Enable
IDF Option	IDF_MIN	Valid minimum digits	2	2		
	IDF_MAX	Valid maximum digits	67	67		
	IDF_OUTFORMAT	Output format	0	0	Output IDF bar code in no format (fixed).	
	IDF_CHKD	Check digit calculation	0	1	0:	Disable
			1		1:	Enable
	IDF_CHKCH	Check character output	0	1	0:	Disable
			1		1:	Enable
ITF Option	ITF_MIN	Valid minimum digits	4	4		
	ITF_MAX	Valid maximum digits	94	94		
	ITF_OUTFORMAT	Output format	0	0	Output ITF bar code in no format (fixed).	
	ITF_CHKD	Check digit calculation	0	1	0:	Disable
			1		1:	Enable
	ITF_CHKCH	Check character output	0	1	0:	Disable
			1		1:	Enable
CODE 93 Option	CODE93_MIN	Valid minimum digits	1	3		
	CODE93_MAX	Valid maximum digits	70	70		
	CODE93_OUTFORMAT	Output format	0	0	Output Code93 bar code in no format (fixed).	
	CODE93_CHKD	Check digit calculation	0	1	0:	Disable
			1		1:	Enable
	CODE93_CHKCH	Check character output	0	0	Disable (fixed)	

Continue.

CODE128 Option	CODE128_MIN	Valid minimum digits	1	2		
	CODE128_MAX	Valid maximum digits	98	98		
	CODE128_OUTFORMAT	Output format (note 4)	0	0	0:	Output Code128 bar code after Full ASCII conversion.
			1		1:	Output Code128 bar code without Full ASCII conversion performed.
			2		2:	Output EAN128 bar code only (note 6).
			6		6:	Output EAN128 bar code only (note 6) with code ID (note 2).
			10		10:	Output EAN128 bar code only (note 6) after Fnc→ GS conversion.
			2		2:	Output EAN128 bar code only (note 6).
			4		4:	Output EAN128 bar code with code ID attached (note 6).
			8		8:	Output EAN128 bar code after Fnc→ GS conversion (notes 2, 6).
			16		16:	Output Code128 bar code without Full ASCII conversion performed.
			32		32:	Output EAN128 bar code without Full ASCII conversion performed. (notes 2, 6)
			64		64	Output Code128 bar code or EAN-128 bar code with FNC2 combined. (note 6)
			128		128	Output Code128 bar code or EAN-128 bar code with expanded FNC4 and ASCII conversion performed. (note 6)
	CODE128_CHKD	Check digit calculation	0	1	0:	Disable
			1		1:	Enable
	CODE128_CHKCH	Check character output	0	0	Disable (fixed)	

Continue.

MSI Option	MSI_MIN	Valid minimum digits	1	1		
	MSI_MAX	Valid maximum digits	57	57		
	MSI_OUTFORMAT	Output format	0	0	No (fixed)	
	MSI_CHKD	Check digit calculation	0	1	0:	No calculation
			1		1:	1 digit, mod 10
			2		2:	2 digits, mod11/mod 10
			3		3:	2 digits, mod10/mod10
	MSI_CHKCH	Check character output	0	1	0:	Disable
			1		1:	Enable
IATA Option	IATA_MIN	Valid minimum digits	1	4		
	IATA_MAX	Valid maximum digits	65	65		
	IATA_OUTFORMAT	Output format	0	0	Disable (fixed)	
	IATA_CHKD	Check digit calculation	0	0	0:	No check digit calculation
			1		1:	Calculation for all digits except the last digit
			2		2:	Calculation for coupon no. and data
			3		3:	Calculation for data block only
			4		4	mod10
	IATA_CHKCH	Check character output	1	1	Enable (fixed)	
RSS-14 Option	RSS14_MIN	Valid minimum digits	14	14	Fixed	
	RSS14_MAX	Valid maximum digits	14	14	Fixed	
	RSS14_OUTFORMAT	Output format	0	0	0:	Output RSS-14 bar code in standard format.
			1		1:	Output RSS-14 bar code without A.I. (note 4)
	RSS14_CHKD	Check digit calculation	1	1	Enable (fixed)	
	RSS14_CHKCH	Check character output	1	1	Enable (fixed)	
RSS Limited Option	RSSLTD_MIN	Valid minimum digits	14	14	Fixed	
	RSSLTD_MAX	Valid maximum digits	14	14	Fixed	
	RSSLTD_OUTFORMAT	Output format	0	0	0:	Output RSS Limited bar code in standard format.
			1		1:	Output RSS Limited bar code without A.I. (note 4)
	RSSLTD_CHKD	Check digit calculation	1	1	Enable (fixed)	
	RSSLTD_CHKCH	Check character output	1	1	Enable (fixed)	
RSS Expanded Option	RSSEXP_MIN	Valid minimum digits	1 to 74	1		
	RSSEXP_MAX	Valid maximum digits	1 to 74	74		
	RSSEXP_OUTFORMAT	Output format	0	0	Output RSS Expanded bar code in no format (fixed).	
	RSSEXP_CHKD	Check digit calculation	1	1	Enable (fixed)	
	RSSEXP_CHKCH	Check character output	1	1	Enable (fixed)	

Continue.

RSS-14 Stacked Option	RSS14_MIN	Valid minimum digits	14	14	Fixed	
	RSS14_MAX	Valid maximum digits	14	14	Fixed	
	RSS14_OUTFORMAT	Output format	0	0	0:	Output RSS-14 Stacked in standard format.
			1		1:	Output RSS-14 Stacked without A.I. (note 4)
	RSS14_CHKD	Check digit calculation	1	1	Enable (fixed)	
	RSS14_CHKCH	Check character output	1	1	Enable (fixed)	
RSS Expanded Stacked Option	RSSEXP_MIN	Valid minimum digits	1 to 74	1		
	RSSEXP_MAX	Valid maximum digits	1 to 74	74		
	RSSEXP_OUTFORMAT	Output format	0	0	Output RSS Expanded Stacked bar code in no format (fixed).	
	RSSEXP_CHKD	Check digit calculation	1	1	Enable (fixed)	
	RSSEXP_CHKCH	Check character output	1	1	Enable (fixed)	
Read Mode Option	READMODE	Setting scanning mode	0	1	0:	Single scanning
			1		1:	Continuous scanning (with Trigger key)
Gain Option	GAIN	Setting gain	0	0	0:	Mode 0
			1		1:	Mode 1
			2		2:	Mode 2
			3		3:	Mode 3
Buzzer Control Option	BUZZER	Setting buzzer	0	1	0:	Disable
			1		1:	Enable
LED Control Option	LEDCTRL	Setting LED	0	2	0:	Disable
			1		1:	Enable
			2		2:	Enable. Disable when fail.
Out Buff Control Option	OUTBUFF	Setting output method	0	0	0:	Output to OBR buffer.
			2		2:	Output to key.
			3		3:	Output to clipboard.
			4		4:	Output to keyboard event.
Suff Char Option	ENDCODE	Termination code	0	4	0:	<CR>
			1		1:	<LF>
			2		2:	<CR>＋<LF>
			3		3:	<TAB>
			4		4:	No termination code

Continue.

Multi-step Read Option	MULTISTEP	Multi-step reading	0	0	0:	Standard read
			1		1:	Multi-step read
Comp Counter Option	CMPCNT	No. of verifications	1 to 9	3		
Read Counter Option	READCNT	No. of times to scan in continuous read mode	1 to 9	1		
Scan Time Option	SCANTIME	Timeout period in second	1 to 9	3		
	FILTERMODE	Noise filter mode (note 1)	0	0	0:	Disable noise filter
			1		1:	Enable software noise filter
			2		2:	Enable hardware noise filter
	FILTERCNT	Period of time in second between when scanning starts and when the noise filter initiates.	1 to 8	3		
Scanning Key Option	KEY	Setting Trigger key (note 1)	1	259	1:	L Trigger key
			2		2:	R Trigger key
			4		4:	Enter key
			8		8:	Cursor ← key
			16		16:	Cursor → key
			32		32:	Cursor ↑ key
			64		64:	Cursor ↓ key
			128		128:	(Gun-trigger key) (note 3)
			256		256:	Center Trigger key
Laser Swing Option	SWING	Setting scan width control mode	0	0	0:	No control
			1		1:	Wide
			2		2:	Standard
			3		3:	Narrow
Laser Focus Option	FOCUS	Setting scan verification beam	0	0	0:	Disable
			1		1:	Enable
Notification Option	NOTIFICATION	Setting scan complete notification (note 1)	1		1:	Notification via window message
			2		2:	Notification via event
Decode Level Option	LEVEL	Setting decode level	0	1	0:	Standard level
			1		1:	High level (dual decode system)

Continue.

Decode Customize Option	BARWIDTH	Setting correction value of thickness of bars	0	0	0:	No correction
			1		1:	Thin black bar
			2		2:	Thin black bar (or thicken black bar)
			3		3:	Thin white bar
			4		4:	Thin white bar (or thicken white bar)
	MARGINCHECK	Setting threshold values for right and left margins	0	0	0:	Maximum
			1		1:	Middle
			2		2:	Narrow
			3		3:	Minimum
Learning Decode Option	LEARINING	Setting learning mode	0	0	0:	Disable
			1		1:	Enable

Notes:

1. To set up multiple bar code symbologies effect, specify a sum of the symbology values you wish to scan.
2. To set up multiple output methods effect, specify a sum of each value of the output methods you wish to set. However, if you set “EAN128 without Full ASCII conversion”, “EAN128 with code ID attached” and “EAN128 Fnc → GS conversion” effect at the same time, “EAN128 without Full ASCII conversion” has the priority over the other settings. Thus, the settings are disabled.
3. Since Gun-trigger key is not integrated in the terminal, the key value is ignored.
4. A.I. is the abbreviation of Application Identifier which is attached at the forefront of bar code of RSS-14, RSS-Limited, and RSS-14 Stacked symbologies.
5. The RSS symbologies change its name to “GS1 DataBar”.
   RSS-14 → GS1 DataBar Omnidirectional
   RSS Limited → GS1 DataBar Limited
   RSS Expanded → GS1 DataBar Expanded
   RSS-14 Stacked → GS1 DataBar Stacked
   RSS Expanded Stacked → GS1 DataBar Expanded Stacked
6. EAN-128 symbology changes its name to “GS1-128”.

The functions of the Laser Scanner Library relevant to the Configuration File are as follows.

OBRSaveConfigFile : Saves all settings for the scanner driver into the configuration file.

OBRLoadConfigFile : Retrieves and then loads the configuration file into the scanner driver.

OBRSetDefaultSymbology : Sets up default status of the Laser Scanner driver.

Dual Decoders System

The dual decoders system initially decodes a scanned bar code data using the standard decoder, but if decoding fails, it uses the following additional decoder to scan the same bar code. This dual decoders system supports the bar code symbologies listed below.

- Code39
- Code128
- EAN

With the decoding system used for the previous CASIO handheld terminals, decoding is processed with a mean value of one module adding bar thickness of each black bar and white bar for one character when performing binaryzation or quardruplzation of bar thickness. However, this method does not accurately decode a bar code if it is formed with unbalanced bar thickness between white bars and black bars.
The dual decoders system can solve it by calculating separately each mean value of black bars and white bars for such a bar code with unbalanced thickness of white and black bars by changing the threshold level of decoding.

The functions of the Laser Scanner Library relevant to the Dual Decoders System are as follows.

OBRSetDecodeLevel : Sets up decoding level.
OBRGetDecodeLevel : Retrieves decoding level.

Customizing the Decoder

According to the scan environment and the bar code printed material's quality, the decoder can be customized to efficiently improve scanning performance. First, to maintain scanning performance with the normal decoding logic, perform decoding using with the decoder and if it does not succeed the decoding, customize it so that the decoding can be performed for a better scanning performance.

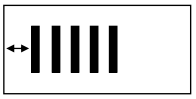
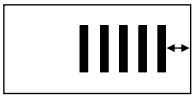
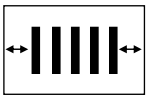
Table 2.47 Customizing the elements

Element	Description
Change margin of the right and left threshold values	Used to change the threshold values of right and left side marginal spaces which are allocated for areas colored in white on the left and right sides of a bar code.
Change of compensation values of the thickness and thinness of a bar.	Used to thicken or thin each bar of bar code for a specified value and then decode it. Value for thickening or thinning each bar can be changed.

Changing the threshold values for Right and Left margins

When a bar code is printed inside of quadrangle, scanning may not be possible because there is not enough left and/or right marginal space. By making change on the right and left marginal threshold values, scanning a bar code becomes possible. See the table below.

Table 2.48

When the left marginal space is narrow.	
When the right marginal space is narrow.	
When both right and left marginal spaces are narrow.	

The functions of the Laser Scanner Library relevant to the “Changing the threshold values for Right and Left margins” are as follows.

OBRSetMarginCheckRatio : Sets up a threshold value for right and left side space margins.
OBRGetMarginCheckRatio : Retrieves the threshold value for right and left side space margins.

Changing the thickness of bars

If bars that form a bar code are printed thick because blurring or scratchy white bars (spaces between two bars) are printed thinly, the bar ratio will not be correct causing scanning incorrectly. Adjusting the thickness of these bars makes scanning the bar code possible. This method is applicable if all bars of a bar code are either too thick or too thin because the method is applied to the whole of a bar code.

The functions of the Laser Scanner Library relevant to the “Changing the thickness of bars” are as follows.

OBRSetBarWidthAdjustment : Sets up the adjustment of thickness of bars.
OBRGetBarWidthAdjustment : Retrieves the adjustment set for the thickness of bars.

Decoder Learning function

This function is to automatically change parameters for criteria and threshold level used to judge on decoding bar code data so that scanning a bar code printed in poor quality can be improved. However, after changing the relevant parameters for the Decoder Learning function, the individual scanning characteristics of each terminal may be degraded. To avoid such degrade, the integrated decoding system starts decoding with the standard decoder and then changes with the customized decoder if decoding at the first stage fails. If the decoding at the end of the process does not succeed, the Decoder Learning function is used to ensure it to be succeeded. Setting either "Enable" or "Disable" for the function to be effect can be set. See the decoding process flow in following figure.

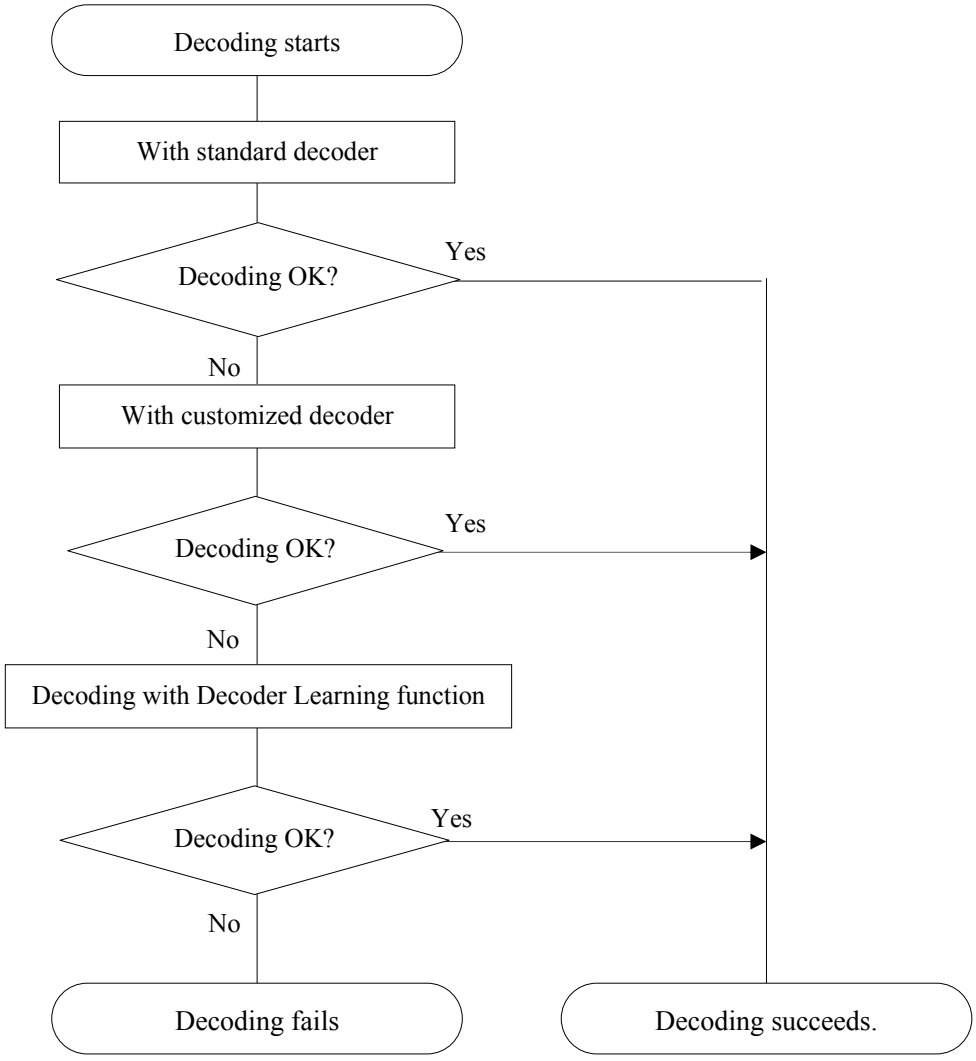


Figure 2.10

The functions of the Laser Scanner Library relevant to the "Decoder Learning function" are as follows.

OBRSetDecodeLearningMode : Sets up the decoder learning mode.
OBRGetDecodeLearningMode : Retrieves the decoder learning mode.

Supported Symbologies

Below is a list of the symbologies which can be effectively scanned using the Decoder Learning function.

- EAN, JAN, UPC-A, UPC-B
- EAN, JAN, UPC-A, UPC-B Add-ons
- UPC-E
- UPC-E Add-on
- Code39
- NW7
- Interleaved 2of5
- Industrial 2of5
- Code93
- Code128
- MSI
- IATA

List of Parameters Subject to Change

The parameters subject to change are those which can be altered using the Customize function and those listed below.

Table 2.49 Customizing the elements

Element	Description
Changing Character Spacing Threshold Values	Enables the threshold values of the bars forming the character spacing (the white space between characters formed by multiple black and white bars) to be responsively modified.
Changing guard bar and delineator threshold values	Enables the threshold values of guard bars (EAN, JAN, UPC-A Right, Left and Center guard bars and UPC-E Right and Left guard bars) and delineators (the white spaces between Add-ons and non-Add-on bars) to be responsively modified.
Changing Thick Bar Determination Threshold Values	Enables the threshold values for determining thick bars to be responsively modified.
Changing Thick Bar Determination Criteria	Enables the bars which form the criteria for determining thick bars (i.e. StartBAR, CenterBAR, Margin etc.) to be responsively modified.
Changing Calculation Method for Thick bar Determination	Enables the operator to switch between the following two calculation methods for determining thick bars. - Calculate combined ratio of black and white bars - Calculate separate ratios of black and white bars
Changing Noise Filter Threshold Values	Enables the noise filter threshold values to be modified.
Changing Character Discrepancy Threshold Values	Enables the threshold values for the total value of bars comprising a single character to be responsively modified.
Changing Minimum and Maximum Bar Threshold Values	Enables the threshold values for the minimum and maximum bars of the bars forming a single character to be responsively modified.

Changing Character Spacing Threshold Values

The decoder identifies wide character spacing as an anomalous pattern, which may result in the inability to scan. Disabling the character spacing determination function overcomes this problem. Depending on the barcode system, some codes may have character spacing while others may not. This change is effective for those codes which have character spacing. The symbologies on which this change is effective are listed below.

- Code39
- NW7
- Industrial 2of5
- IATA

While Industrial 2of5 and IATA symbologies do not have character spacing, it is possible to enable or disable the check which is carried out to determine the ratio of the white bars located between the black bars.

Changing Guard Bar and Delineator Threshold Values

When scanning EAN, JAN, UPC-A, and UPC-E symbologies, it may not be possible to scan due to irregular guard bar ratios. Similarly, when reading Add-on symbology, it may not be possible to scan due to irregular delineator ratios. This problem can be overcome by disabling the guard bar and delineator check functions.
The guard bar element is only present in EAN, JAN, UPC-A, and UPC-E symbologies while the delineator element is only present in Add-on symbology. This change is effective on the following symbologies.

- EAN, JAN, UPC-A, UPC-B
- EAN, JAN, UPC-A, UPC-B Add-ons
- UPC-E
- UPC-E Add-on

Changing Thick Bar Determination Threshold Values

Scanning may be hampered by misidentification of the bar pattern which occurs when only the thick or thin bars are printed or when the gap between the thick and thin bars is slight. This problem can be eliminated by changing the threshold values for determining thick bars. This change is effective on the following symbologies.

- Code39
- NW7
- EAN, JAN, UPC-A, UPC-B
- EAN, JAN, UPC-A, UPC-B Add-ons
- UPC-E
- UPC-E Add-on
- Industrial 2of5
- Interleaved 2of5
- Code93
- Code128
- IATA

Changing Thick Bar Determination Criteria

Optical and print characteristics may result in discrepancies in the thickness of black and white bars, thereby preventing accurate ratios from being obtained during scanning. By checking the left guard bar and central bar, the black and white bar discrepancies are obtained and incorporated into the thick bar determination. Changing the position of the bars to be checked can enhance the scanning accuracy of bar codes which contain some bars with anomalous ratios.
Depending on the bar code system, some codes may have left guard bars and center bars while others may not. This change is effective for those codes which have the elements. The symbologies on which this change is effective are listed below.

- EAN, JAN, UPC-A, UPC-B
- EAN, JAN, UPC-A, UPC-B Add-ons
- UPC-E
- UPC-E Add-on

Changing Calculation Method for Thick bar Determination

Optical and print characteristics may result in discrepancies in the thickness of black and white bars, thereby preventing accurate ratios from being obtained during scanning. This means that scanning may not be possible when the ratios of the black and white bars are not uniform. This problem can be overcome by analyzing the black and white bars separately.
Depending on the bar code system, this method of analyzing the black and white codes separately is effective for some symbologies but not for others. The symbologies on which this analysis method is effective are listed below.

- EAN, JAN, UPC-A, UPC-B
- EAN, JAN, UPC-A, UPC-B Add-ons
- UPC-E
- UPC-E Add-on
- Code39
- NW7
- Code93
- Code128

Changing Noise Filter Threshold Values

A combination of laser module optical characteristics and barcode printing conditions can generate noise within the bar code scanning data resulting in the inability to scan. This problem can be dealt with by removing noise. This is achieved by identifying all data at or below a prescribed threshold value as noise and removing it when detected by linking it to preceding and subsequent data.

Changing Character Discrepancy Threshold Values

When a comparison of the total value of bars comprising each character is performed during scanning and said value is either too large or too small compared to that of the other characters, it is processed as an anomalous pattern. This may result in the inability to scan due to the ratio of a single character becoming either larger or smaller than the others. This problem can be overcome by disabling the character discrepancy check.
Depending on the bar code system, some symbologies perform character discrepancy checks while others do not. This change is effective for those symbologies which perform character discrepancy checks. The symbologies which perform this check are as follows.

- EAN, JAN, UPC-A, UPC-B
- EAN, JAN, UPC-A, UPC-B Add-ons
- UPC-E
- UPC-E Add-on

Changing Minimum and Maximum Bar Threshold Values

When the thickest bar or thinnest bar among those comprising each character exceeds or falls below the upper or lower thresholds respectively during scanning, they are processed as anomalous patterns. For this reason, scanning may not be possible when a single bar is excessively thick or thin, or when thick or thin bars are excessively thick or thin. This problem can be overcome by disabling the minimum and maximum bar check function.
Depending on the bar code system, some symbologies perform minimum and maximum bar checks while others do not. This change is effective for those symbologies which perform minimum and maximum bar checks. The symbologies which perform this check are as follows.

- NW7
- Interleaved 2of5

Parameter Precedence Change function

The operating order of the relevant parameters used in success decoding bar code data with the Decoder Learning function can be advanced for precedence. This advance will result in quick response of continuously scanning multiple bar codes with similar quality. Since the precedence order is stored in the RAM memory, it will be reset to the default order if a reset is performed on the terminal.

Erratic Scanning Avoidance function

This function retrieves the bar code quality rank by calculating the decoder easiness when scanning a bar code. If the quality rank of scanned bar code is relatively low, the error rate becomes high causing an erratic scanning to occur. To suppress the error rate, the function automatically makes judgment on scanning with such the bar code as “Failure”.

Enabling or Disabling the Decoder Learning function

The Decoder Learning function can be switched to either “Enable” or “Disable”. This switch can be made using the functions or settings file provided by the Laser Scanner Library.

Note:
Enabling the Decoder Learning function improves the scanning performance for poorly printed bar codes. However, it may also increase the likelihood of erroneous scanning depending on the bar code you scan. The following settings should therefore be used in conjunction with the Decoder Learning function in order to prevent erroneous scanning.

- Turn off the scanning functions for reading all symbologies other than those to be scanned.
- Turn off the scanning functions for reading symbologies that exceed the maximum readable digits of the symbologies you wish to scan. This applies to only symbologies that allow setting for the maximum readable digits.
- Set the check digit effect. This applies to symbologies for which the check digit can be set.

2.2.7 Power Control

In order to save the power, the power is not supplied to the laser scan module and the ASIC module for laser beam control both integrated in the terminal during the laser beam is not irradiating. It is supplied to these modules when the laser beam is to be irradiated, and turned off again when the laser beam is not irradiated.

2.3 CMOS Imager

This chapter describes about detailed specifications of the CMOS Imager which is model dependant. See Table 1.1.

2.3.1 Basic Specifications

The following industrial standard 1D symbologies are supported by the integrated CMOS Imager.

Table 2.50 1D bar code symbologies

Symbology	Minimum digits	Maximum digits	Check character	Check character output	Output format/Add-on function
EAN8	8 (+2/5)		Enable	Enable or Disable	2 digits/5 digits added-on
EAN13	13 (+2/5)		Enable	Enable or Disable	2 digits/5 digits added-on
UPC-A	12 (+2/5)		Enable	Enable or Disable	NS output 2 digits/5 digits added-on
UPC-E	6 (+2/5)		Enable	Enable or Disable	NS output UPCA conversion 2 digits/5 digits added-on
Code39	1	22	Enable or Disable	Enable or Disable	Output of start/stop bits Full ASCII conversion Add-on code
Codabar (NW7)	2	26	Enable or Disable	Enable or Disable	Output of start/stop bits
Interleaved 2of5 (ITF)	4	42	Enable or Disable	Enable or Disable	
Code93	1	35	Enable	Disable	
Code128, EAN128 (note 2)	1	28	Enable	Disable	Code A/B
	1	56	Enable	Disable	Code C
MSI(Plessey)	4	26	Enable	Enable or Disable	
IATA	4	24	Enable	Disable	
Code11	1	40	Enable(2)	Disable	
RSS-14 (Standard/Truncated)	14		Enable	Disable	
RSS Limited	14		Enable	Disable	
RSS Expanded (Standard)	1	40	Enable	Disable	
ISBT (note 1)	1	28	Enable	Disable	

Notes:

1. ISBT symbology is decoded as Code128 symbology.
2. EAN128 symbology changes its name to “GS1-128”.

Table 2.51 2D Stacked code symbologies

Symbology	Minimum digits	Maximum digits	Check character	Check character output	Output format/Add-on function
Code49	1	81	Enable	Disable	
PDF417	1	2,000	Enable	Disable	
MicroPDF	1	366	Enable	Disable	
Codablock F (note 1)	0	200	Enable	Disable	
EAN8/13 Composite	2	338	Enable	Disable	
RSS Composite (note 3)	2	338	Enable	Disable	
UCC/EAN128 Composite (note 2)	6	2361	Enable	Disable	
TLC39	-	279	Enable	Disable	
RSS-14 (Stacked type) included Standard Omni directional (note 3)	14		Enable	Disable	
RSS Expanded (Stacked type) (note 3)	1	20	Enable	Disable	

Notes:

1. Since Codablock F is a stacked code of the Coda128 symbology, a part of symbol of the Code128 symbology may be read if the Code128 symbology is set to “Enable”.
2. EAN128 symbology changes its name to “GS1-128”.
3. RSS symbology changes its name to “GS1 DataBar”.

Table 2.52 2D Matrix code symbologies

Symbology	Minimum digits	Maximum digits	Check character	Check character output	Output format/Add-on function
Aztec	1	2,000	Enable	Disable	
QR Code	1	1,500	Enable	Disable	
Maxicode	1	138	Enable	Disable	
DataMatrix	1	1,000	Enable	Disable	ECC000/050/080/100/ 140/200

Note:

The maximum numbers of digits listed in the above table apply to cases where the entire symbology consists of numeric characters only. The maximum number is reduced to two third (2/3) of each maximum no. of digits for alpha-numeric characters; and reduced to one third (1/3) for Kanji characters and binary numbers. These are merely reference, and the actual range of readable symbologies varies according to the conditions (resolution, PCS, etc.) of individual symbol and the surrounding environment.

2.3.2 Scanning Method

Multi-step Read

This function continuously performs decoding as long as one of the R/L Trigger keys is held down. Once bar codes are decoded they are not read any more. This function is useful for reading all bar codes without repeating the same action when more than one bar code is printed on one slip.

Package Read

This function outputs the read result retrieved from more than one bar code in a package. With the multi-step read function, once bar codes are decoded they are not read any more. This is useful for handling multiple pieces of bar code data. However, if any of the following unfavorable conditions occur, all the bar codes may not be read in one capture:

- The objective bar code of read is not contained in the captured image.
- The focus is not sharp enough.
- The exposure is not correct.

Table 2.53 Difference between Multi-step and Package Reads

Performance	Multi-step Read Mode	Package Read Mode
Maxi. no. of bar codes to read (Max. no. of read steps)	10	10
Max. no. of digits to read	4,095	4,095 (see note below.)
Total no. of digits to read	4,095 x 10 = 40,950	4,095
Read method	Continuously reads the specified number of bar codes as long as the Program key is held down. Different from Package read in which multiple bar codes are read at a single scan, a single kind of a symbol will be continuously read through multi read steps. If one bar code is read, the buzzer sounds and the LED turns on.	Multiple bar codes are read in a single scan. Neither the buzzer sounds nor the LED turns on until the specified no. of bar codes has been read.
Recommended method of use	This mode is suitable in the following cases: If the bar code has many digits. If the target bar codes are spaced. To positively confirm a read.	This mode is suitable in the following case: If multiple bar codes with small number of digits are adjacent to one another.

Note:
The terminal has been designed so that a maximum of 10 bar codes or 4,095 digits of bar codes can be read. However, it is not recommended for the user to use the package read mode for reading bar codes consisting of a large number of digits. If the number of bar codes is greater than 4, or if the total number of digits is greater than 100, use the multiple-step read mode as much as possible.

The functions of the Imager Library relevant to the Scanning Method are as follows.

IMGSetDecodeMode : Sets up scanning mode.
IMGGetDecodeMode : Retrieves the scanning mode.
IMGWaitForDecode : Carries out decoding symbol.
IMGWaitForDecodeRaw : Carries out decoding symbol including its binary data.

2.3.3 Scanning Parameters

Condition that allows scanning a symbology in specific modes can be set for each readable symbology.

Readable Symbology

Bar code symbologies that are enabled or disabled for scanning can be specified. If only specific symbologies are to be scanned, set “Enable” for scanning on these symbologies only and “Disable” on the other symbologies. This reduces decode processing time and lowers the error rate. The default is “Enable scanning on all the symbologies”.

Readable Digits

The no. of readable digits can be set for each symbology. If only specific no. of digits is to be scanned, specify it for each readable symbology. This reduces decode processing time and lowers the error rate.

Enable or Disable Check Digit

Check digit can be set to “Enable” or “Disable” for each readable symbology. Setting the check digit will lower the error rate.

The functions of the Imager Library relevant to the Scanning Parameters are as follows.

IMGSetAztec	:	Sets up decode options for Aztec symbology.
IMGGetAztec	:	Retrieves the decode options for Aztec symbology.
IMGSetCodabar	:	Sets up decode options for Codabar symbology.
IMGGetCodabar	:	Retrieves the decode options for Codabar symbology.
IMGSetCodablock	:	Sets up decode options for Codablock F symbology.
IMGGetCodablock	:	Retrieves the decode options for Codablock F symbology.
IMGSetCode11	:	Sets up decode options for Code11 symbology.
IMGGetCode11	:	Retrieves the decode options for Code11 symbology.
IMGSetCode128	:	Sets up decode options for Code128 symbology.
IMGGetCode128	:	Retrieves the decode options for Code 128 symbology.
IMGSetCode39	:	Sets up decode options for Code39 symbology.
IMGGetCode39	:	Retrieves the decode options for Code39 symbology.
IMGSetCode49	:	Sets up decode options for Code49 symbology.
IMGGetCode49	:	Retrieves the decode options for Code49 symbology.
IMGSetCode93	:	Sets up decode options for Code93 symbology.
IMGGetCode93	:	Retrieves the decode options for Code93 symbology.
IMGSetComposite	:	Sets up decode options for Composite symbology.
IMGGetComposite	:	Retrieves the decode options for Composite symbology.
IMGSetDataMatrix	:	Sets up option settings for DataMatrix symbology.
IMGGetDataMatrix	:	Retrieves the decode options for DataMatrix symbology.
IMGSetEAN13	:	Sets up decode options for EAN13 symbology.
IMGGetEAN13	:	Retrieves the decode options for EAN13 symbology.
IMGSetEAN8	:	Sets up decode options for EAN8 symbology.
IMGGetEAN8	:	Retrieves the decode options for EAN8 symbology.

Continue.

IMGSetIATA : Sets up decode options for IATA 2of5 symbology.
IMGGetIATA : Retrieves the decode options for IATA 2of5 symbology.
IMGSetITF : Sets up decode options for Interleaved 2of5 symbology.
IMGGetITF : Retrieves the decode options for Interleaved 2of5 symbology.
IMGSetISBT : Sets up decode options for ISBT symbology.
IMGGetISBT : Retrieves the decode options for ISBT symbology.
IMGSetMaxicode : Sets up decode options for Maxicode symbology.
IMGGetMaxicode : Retrieves the decode options for Maxicode symbology.
IMGSetMicroPDF : Sets up decode options for MicroPDF symbology.
IMGGetMicroPDF : Retrieves the decode options for MicroPDF symbology.
IMGSetMSI : Sets up decode options for MSI symbology.
IMGGetMSI : Retrieves the decode options for MSI symbology.
IMGSetPDF417 : Sets up decode options for PDF417 symbology.
IMGGetPDF417 : Retrieves the decode options for PDF417 symbology.
IMGSetQR : Sets up decode options for QR Code symbology.
IMGGetQR : Retrieves the decode options for QR Code symbology.
IMGSetRSS : Sets up decode options for RSS symbology.
IMGGetRSS : Retrieves the decode options for RSS symbology.
IMGSetTLC39 : Sets up decode options for TLC39 symbology.
IMGGetTLC39 : Retrieves the decode options for TLC39 symbology.
IMGSetUPCA : Sets up decode options for UPC-A symbology.
IMGGetUPCA : Retrieves the decode options for UPC-A symbology.
IMGSetUPCE : Sets up decode options for UPC-E symbology.
IMGGetUPCE : Retrieves the decode options for UPC-E symbology.

2.3.4 Scan Result Notification

The notification of the read completion of a symbol can be posted using one of the following two integrated devices. The buzzer sound level can be set up at the Control Panel.

Table 2.54

Device	Setting	Read succeeded	Read failed	Read terminated (release the Trigger key)	Default
LED	Green and Red	Lit in green	Lit in red	None	Green and Red
	Green	Lit in green	None	None	
	Invalid	None	None	None	
Buzzer	Valid	Sound	None	None	Valid
	Invalid	None	None	None	

The functions of the Imager Library relevant to the Scan Result Notification are as follows.

IMGSetLED : Sets up notification via LED for scanning complete.
IMGGetLED : Retrieves the notification via LED for scanning complete.
IMGSetBuzzer : Sets up notification via buzzer for scanning complete.
IMGGetBuzzer : Retrieves the notification via buzzer for scanning complete.

2.3.5 Expanded Features

Decoder Customize function

This function adjusts the scanning speed to facilitate scanning of hard-to-read symbols.

Decoder Deliberation Levels

The level of deliberation with which symbols are scanned can be set at five different levels. Setting the level to Very Quick or Quick limits symbols which can be decoded, but increases the decoding speed. Alternatively, setting the level to Deliberate of Very Deliberate allows many symbols to be read but slows down the decoding speed.

Table 2.55

Decoding Deliberation Levels	Target	Speed
Very Quick	1D bar codes with good print quality	Very fast
Quick	1D bar codes with poor print quality PDF417 barcodes with 500 digits or less	Fast
Normal	Package scanning PDF417, DataMatrix, QR, Aztec, MicroPDF, Code49, Codablock F, Maxicode, Composite bar codes with 1000 digits or less.	Normal (default)
Deliberate	PDF417, DataMatrix, QR, Aztec bar codes with 1000 to 2000 digits. TTLC39, RSS-14 Stacked, RSS Expanded Stacked bar codes with 80 digits or less.	Slow
Very Deliberate	PDF417, QR, Aztec bar codes with 2000 digits or more TLC39 bar code with 80 digits or more	Very slow

The functions of the Imager Library relevant to the “Decoder Deliberation Levels” are as follows.

IMGSetDeliberation : Sets up deliberation level for decoding symbol.
IMGGetDeliberation : Retrieves the deliberation level for decoding symbol.

Print Weight Adjust function

This function improves scanning of bar codes with thick or thin bars. Seven scales of the setting are available. In ordinary condition, the setting does not required to adjust. However, it is useful to improve scanning performance on bar code in a difficult condition.

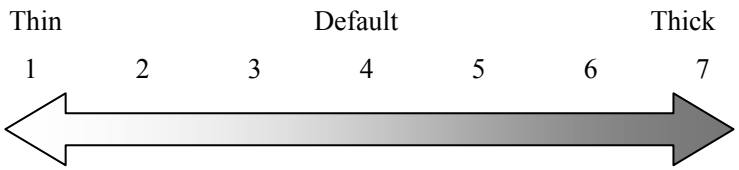


Figure 2.11

The functions of the Imager Library relevant to the Print Weight are as follows.

IMGSetPrintWeight : Sets up print weight of bar thickness used for decoding symbol.
IMGGetPrintWeight : Retrieves print weight of bar thickness used for decoding symbol.

Complementary Scanning functions

Automatic Linking of Combined Symbols

The CMOS Imager provides support for combining symbols. When scanning the following combined symbols, the scanned data is stored in the internal buffer and all of the data from combined symbols or all scanned symbols is combined and output.
Combined symbols can only be scanned when the decoding mode is set to “Normal Scan”. Note that combined symbols cannot be scanned in “Multi-step Scan” and “Package Scan” modes.

Table 2.56

Symbol	Target	Method
Code93	Code93 bar codes with a space for leading data	When scanning symbols whose lead begins with a space, the scanned data is stored in the internal buffer without being output. Furthermore, when continuously scanning symbols starting with a space, the data is combined in the internal buffer in the order that it is scanned and is not output. Finally, when scanning symbols other than those whose lead begins with a space, it is combined with the internally stored data and output.
Code49	Code49 bar codes with lead starting with mode 1(M=1)	Combination method same as for Code93. Different to Code93 in that the combined symbol lead starts with M=1.
QR Code	QR Code including combination identifier.	Indicators displaying the number of symbol divisions and the sequential number of the symbol are stored in the combined QR Code. The decoder is therefore able to combine and output all data in the order of the indicators upon scanning all of the symbols.

Binary Data Scanning

The CMOS Imager is able to output data scanned from symbols not only in standard character strings but also in binary data. It is therefore possible to scan binary data of encoded data, images and audio as well as character strings delimited by NULL characters.

The function of the Imager Library relevant to the “Binary Data Scanning” is as follows.

IMGWaitForDecodeRaw : Carries out decoding symbol including its binary data.

Image Capture Function

This function is used to capture image data and save it as JPEG file. Using the function together with the JPEG Library, the captured image data is output as image data in either 2-gray scale or 256-gray scale. The captured image data can also be output in low resolution by reducing its size. The following table shows the reductions and sizes.

Table 2.57

Reduction		1/1, 1/2, 1/4
Size	1/1 reduction	752 x 480 pixels
	1/2 reduction	376 x 240 pixels
	1/4 reduction	188 x 120 pixels
	Partial extraction is possible.	
Scale		2- or 256-gray scale

The functions of the Imager Library and JPEG Library relevant to the “Image Capture Function” are as follows.

IMGGetImage : Captures still image.
JPGEncodeToFile : Encodes RGB data or YUV data to output the result as JPEG file.
JPGEncodeToFileEx : Encodes RGB data or YUV data to output the result as JPEG file. It specifies “with thumbnail” or “without thumbnail”.

Signature Index Function

This function scans both symbol and signature at one time and outputs the symbol data and indexed signature at the same time. The position and size of a signature can be specified in the user application based on the position of the symbol.

The function automatically corrects the up and down positions of the captured symbol in correspondence with the up and down positions of the image data even if it has been captured upside down or diagonally, and then outputs it.

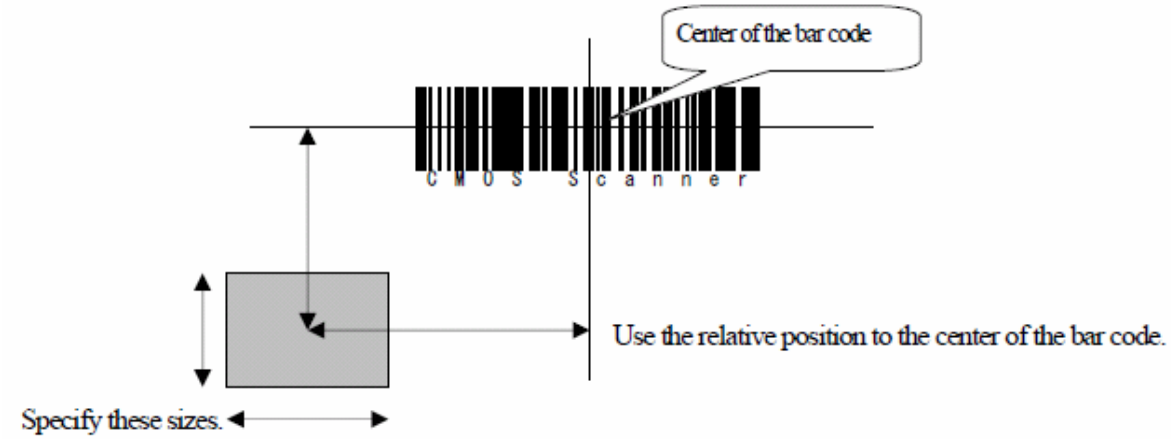


Figure 2.12

- Supported symbols
  - Code39
  - Codabar (NW7)
  - Code128
  - PDF417
  - Aztec

The functions of the Imager Library relevant to the “Signature Index Function” are as follows.

IMGCaptureSign : Retrieves captured signatures.
IMGWaitForDecode : Carries out decoding symbol.
IMGWaitForDecodeRaw : Carries out decoding symbol including its binary data.

Streaming Display Function

This function sequentially displays an image while continuously operating the CMOS Imager. With the image capturing function in “Image Capture Function”, the streaming display function can be used to display image preview.

Table 2.58

Reduction		1/1, 1/2, 1/4
Size	1/1 reduction	188 x 120 pixels
	1/2 reduction	
	1/4 reduction	
	Partial extraction is possible.	
Scale		256-gray scale
Frame rate		15 fps or less (see note)

Note:
The rate may fluctuate depending on the surroundings brightness or the load on the system by concurrently running program.

The functions of the Imager Library relevant to the “Streaming Display Function” are as follows.

IMGStartStream : Starts streaming images.
IMGGetStreamData : Retrieves data of streaming images.
IMGStopStream : Stops streaming images.

Illumination LED and Aimer

The terminal integrates the illumination LED for lighting and the Aimer for focusing a symbol to scan. Setting the intensity of the illumination LED to zero will turn off.
This setting is useful when the terminal is used outdoor where the illumination LED is not needed, or when a stamp in red is to be read.

The functions of the Imager Library relevant to the “Illumination LED and Aimer” are as follows.

IMGAimerOn : Turns on or off the Aimer.
IMGIlluminationOn : Turns on or off the illumination LED.

Imager's APO

This function will shut down the power to the CMOS Imager automatically if it has not been used for a while.
After activating the APO (Automatic Power OFF) function, the imager's power can be turned on again if one of the following functions is invoked. The time period of the APO function can be set up in the range of 0 to 1,800 seconds. Specifying "0" will disable it.
The power consumption by the imager can be curbed while the APO function is activating. However, note that it takes about 30 milliseconds to put the power back on.

The functions of the Imager Library relevant to the Imager's APO are as follows.

IMGSetImagerAPO : Sets up time period for Auto Power OFF.
IMGGetImagerAPO : Retrieves time period for Auto Power Off.

Configuration File

The various setting values made at "Imager Setting" of the Control Panel can be stored in an INI-type file and resumed. The configuration file storage location and its name are "\FlashDisk\System Settings\IMGSet.ini".

By calling **IMGLoadConfigFile** function, the content in the configuration file is deployed into the Imager, or the default values are used to initiate the Imager if there is no such the configuration file.

The functions of the Imager Library relevant to the Configuration File are as follows.

IMGLoadConfigFile : Sets up the Imager using configuration file.
IMGSaveConfigFile : Retrieves the Imager settings and saves into configuration file.

The setting in the configuration file is divided into two parts, the setting for scanning bar codes and the other for common operations. See the next three pages.

Setting for Scanning Bar Codes

For each symbology, parameters that can define the scanning performances are specified with its individual symbology name in the section name (see Table 2.59).

Table 2.59

Item		Description	Setting
[Symbology] Section			
	Enable	Sets up “Enable” or “Disable” for scanning a symbology.	0; disable, 1; enable
	Min	Specifies the minimum no. of digits for scanning a symbology.	
	Max	Specifies the maximum no. of digits for scanning a symbology.	
	Output Start/Stop Code	Sets up “Enable” or “Disable” for output of start and stop codes.	0; disable, 1; enable
	Read On Check Char	Sets up “Enable” or “Disable” for scanning a symbology with check character.	0; disable, 1; enable
	Read On Check Digit		
	Output Check Char	Sets up “Enable” or “Disable” for output of check character.	0; disable, 1; enable
	Output Check Digit		
	Read On 2 Check Digit	Sets up “Enable” or “Disable” for scanning a symbology with 2-digit check character.	0; disable, 1; enable
	Full ASCII	Sets up “Enable” or “Disable” for output of Full ASCII conversion.	0; disable, 1; enable
	Only Carrier Message	Sets up “Enable” or “Disable” for output of carrier message only.	0; disable, 1; enable
	Append 2Digit Addon	Sets up “Enable” or “Disable” for output of 2-digit addon data.	0; disable, 1; enable
	Append 5Digit Addon	Sets up “Enable” or “Disable” for output of 5-digit addon data.	0; disable, 1; enable
	Request Addon	Sets up “Enable” or “Disable” for scanning a symbology only with addon data.	0; disable, 1; enable
	Separate Addon	Sets up “Enable” or “Disable” for output addon data separated with space.	0; disable, 1; enable
	Output System Number	Sets up “Enable” or “Disable” for output of system number.	0; disable, 1; enable
	Expand Version E	Sets up “Enable” or “Disable” for output of 12-digit expanded UPCA symbology.	0; disable, 1; enable

Setting for Common Operations

The settings in Table 2.60 are for the common operations not related to scanning bar codes.

Table 2.60

Item		Description	Setting	Default
[PrintWeight] Section				
	PrintWeight	Specify the calibration value for thickness of bars.	Specify in the range of 1 to 7.	4
[Intensity] Section				
	Aimer	Specify the intensity of the Aimer.	Specify 0 or 100.	100
	Illumination	Specify of the intensity of the Illumination LED.	Specify 0 or 100.	100
[Multi-step] Section				
	ReadMode	Specify read mode.	0; Normal read 1; Multi-step read 2; Package read	0
	ReadTimes	Specify the no. of times to scan in continuous mode.	Specify in the range of 2 to 10.	2
	Separator	Specify the separator (= symbol) in Package read mode.	Specify character casted in INT-type.	0
[Scan Mode] Section				
	Scan Mode	Specify scanning mode.	0; Outdoor 1; Indoor (window side) 2; Indoor 3; Warehouse	1
[Decode Deliberation] Section				
	Decode Deliberation	Set the deliberation level.	100; Extremely fast decoding, but limited symbologies. 200; Fast decoding with some limited symbologies. 400; Normal 800; Slow decoding, but adequate number of symbologies covered. 0; Extremely slow decoding, but many symbologies covered	400
[Search Mode] Section				
	Search Mode	Search mode	-	1

Continue.

[Auto Power OFF] Section				
	Auto Power OFF	Imager's APO timer	Specify in the range of 0 to 1800 (in second), "0" disables APO, "1 to 1800" turns off the power to the Imager after the time period has elapsed.	60
[Indicator] Section				
	LED	Specify turning on the LED when scanning is complete.	0; disable, 1; enable in green, 2; enable "success" in green and "failure" in red	2
	Buzzer	Specify turning on the buzzer when scanning is complete.	0; disable, 1; enable	1

2.4 Digital Camera

This chapter describes about detailed software specifications of the integrated digital camera (model dependant).

The camera driver integrated in the DT-X30 series handheld terminals is compatible with the Windows Driver Model (WDM) of Microsoft. Application program runs on the terminal can utilize the camera functions by controlling DirectShow API. Note that the Camera Library developed by Casio is not operable on the Windows Mobile models.

In this chapter, the properties of the DirectShow that can be set for the DT-X30 series handheld terminals are mainly explained. For detail of how to use the DirectShow, refer to the document available in Windows Mobile 6 SDK.

2.4.1 Basic Specifications

The terminal (model dependant) offers the following functions via the integrated digital camera module.

Table 2.61

<table>
<tr><th>Item</th><th colspan="5">Setting Parameter</th><th>Remarks</th></tr>
<tr><td>Recorded image file format (Still image capture/consecutive shooting)</td><td colspan="5">JPEG</td><td>- Available JPEG image quality</td></tr>
<tr><td rowspan="9">Size of captured still images</td><td rowspan="2">Mode</td><td colspan="2">Portrait</td><td colspan="2">Landscape</td><td></td></tr>
<tr><td>Width</td><td>Height</td><td>Width</td><td>Height</td><td></td></tr>
<tr><td>UXGA</td><td>1200</td><td>1600</td><td>1600</td><td>1200</td><td rowspan="7"></td></tr>
<tr><td>Quad-VGA</td><td>960</td><td>1280</td><td>1280</td><td>960</td></tr>
<tr><td>XGA</td><td>768</td><td>1024</td><td>1024</td><td>768</td></tr>
<tr><td>SVGA</td><td>600</td><td>800</td><td>800</td><td>600</td></tr>
<tr><td>VGA</td><td>480</td><td>640</td><td>640</td><td>480</td></tr>
<tr><td>1/4VGA</td><td>240</td><td>320</td><td>320</td><td>240</td></tr>
<tr><td rowspan="4">Finder (preview) display</td><td rowspan="2">Mode</td><td colspan="2">Portrait</td><td colspan="2">Landscape</td><td rowspan="2"></td></tr>
<tr><td>Width</td><td>Height</td><td>Width</td><td>Height</td></tr>
<tr><td>1/4VGA</td><td>240</td><td>320</td><td>320</td><td>240</td><td>- Each size at the left is the size output by the camera module which can be modified freely when displaying it.</td></tr>
<tr><td colspan="5">Frame rate
15.0 fps or more</td><td>- When circumferential luminance is 500 lx or more.</td></tr>
<tr><td>Zoom function</td><td colspan="5">Digital Zoom
(XGA capture mode: x1.5)
(SVGA capture mode: x1.5, x2.0)
(VGA capture mode: x1.5, x2.0)
(1/4VGA capture mode: x1.5, x2.0)</td><td></td></tr>
<tr><td>Recorded video file format</td><td colspan="5">WMV</td><td></td></tr>
<tr><td rowspan="3">Size of captured video clips</td><td rowspan="2">Mode</td><td colspan="2">Portrait</td><td colspan="2">Landscape</td><td rowspan="3"></td></tr>
<tr><td>Width</td><td>Height</td><td>Width</td><td>Height</td></tr>
<tr><td>1/4VGA</td><td>240</td><td>320</td><td>320</td><td>240</td></tr>
</table>

Note:
The orientation (Portrait or Landscape) in Table 2.61 is dependant on the screen orientation of the terminal. See “Screen” settings.

2.4.2 Capturing Images

Capture Static Image and Save in File

This function captures single static image and then outputs it in BMP or JPEG format file.

Table 2.62

Item	Setting Parameter				
Image size to capture	Mode	Portrait		Landscape	
		Width	Height	Width	Width
	UXGA	1200	1600	1600	1200
	Quad-VGA	960	1280	1280	960
	XGA	768	1024	1024	768
	SVGA	600	800	800	600
	VGA	480	640	640	480
	1/4VGA	240	320	320	240
File format	JPEG file				

The camera driver notifies the operator of the terminal that the image has been captured with the shutter sound. Focus adjustment can be performed using the Auto Focus function and the fixed-focus switch (10 levels), thereby enabling the operator to capture a focused image.

Note:
Prior to capturing static images, secure the sufficient memory size (recommended 2Mbytes or more) remained in storage where the captured static images are stored.

Preview Display

This is for displaying an image in real time being captured by the camera. The following are image sizes and frame rates for preview display.

Table 2.63

Item	Parameter				
Screen size in preview display	Mode	Portrait		Landscape	
		Width	Height	Width	Width
	1/4VGA	240	320	320	240
	Each image size above can be magnified by “x1.0”, “x1.5”, or “x2.0”.				
Frame rate	15 or more frames per second				

Digital Zoom

The digital zoom is a function used to cut out a part of image from the high-resolution image. The following image sizes and magnifications can be used for digital zoom shooting.

Table 2.64 Digital Zoom

Magnification	1/4VGA	VGA	SVGA	XGA	Quad-VGA	UXGA
x 1.5	Yes	Yes	Yes	Yes	No	No
x 2.0	Yes	Yes	Yes	No	No	No

Note:
If shooting is performed in one of the modes marked as "No" in the table, shooting is made without digital zoom ("x 1.0") effect.

Setting the property of the DirectShow relevant to the Digital Zoom is as follows.

```
Set(CameraControl_Zoom, SetValue, CameraControl_Flags_Manual)
```

Values to set are as follows.

10 : x 1.0.
15 : x 1.5
20 : x 2.0

White Balance

The following modes of the white balance can be set.

Table 2.65 White balance

Auto
Shooting in outdoor in cloudy sky (color temperature = 6500K)
Shooting under fluorescent lamp (color temperature = 5000K)
Shooting under incandescent lamp (color temperature = 2850K)

Note:
If the desired image is not captured in "Auto" mode of white balance, specify an optimum white balance mode consistent with the light source. However, even if such the optimum white balance mode is set, other light sources reflected by walls, etc., may affect the color temperature causing the image to be displayed in an incorrect color tone.

Setting the property of the DirectShow relevant to the White Balance is as follows.

```
Set(VideoProcAmp_WhiteBalance, SetValue, SetFlag)
```

Flags to set are as follows.

VideoProcAmp_Flags_Auto : Auto white balance
VideoProcAmp_Flags_Manual : Fixed white balance

Values for fixed white balance are as follows.

6500 : In outdoor.
5000 : Under fluorescent lamp.
2850 : Under incandescent lamp.

Brightness Correction

This is for correcting the brightness. “Brightness” referred to in this explanation is the target value for automatic exposure. Exposure is determined automatically in accordance with the brightness of the object, but a target value if you wish to set also can be set in the range of -6000 (dark) to 6000 (bright). The default is 0.

Setting the properties of the DirectShow relevant to the Brightness Correction is as follows.

```
Set(VideoProcAmp_Brightness, SetValue, VideoProcAmp_Flags_Manual)
```

Values to set are as follows.

-6000	:	Darkest
-5500	:	
-5000	:	
-4500	:	
-4000	:	
-3500	:	
-3000	:	
-2500	:	
-2000	:	
-1500	:	
-1000	:	
-500	:	
0	:	Default
500	:	
1000	:	
1500	:	
2000	:	
2500	:	
3000	:	
3500	:	
4000	:	
4500	:	
5000	:	
5500	:	
6000	:	Brightest

Flash

The LED flash can be used when capturing still images. The LED flash has two modes: Flash Off (default) and Flash On.

Table 2.66

Item	Setting Parameter
LED Flash	Flash Off (default), Flash On

Setting the property of the DirectShow relevant to the Flash is as follows.

```
Set(CameraControl_Flash, SetValue, CameraControl_Flags_Manual)
```

Values to set are as follows.

0 : Flash Off
1 : Flash On

Compulsory Shutter Sound

The shutter sound is generated by the audio during shooting photos. To prevent video voyeurism, whatever the case, it is forced to sound including when the audio is set to mute and when a set of earphones is being used.

Focus Adjustment

The CMOS digital camera comes with a focus adjustment function to enable the operator to capture focused images. This adjustment comes in the form of a fixed-focus switch and an autofocus feature. The fixed-focus switch enables the application program to switch the focus to suit the distance to the object being captured.
The autofocus feature automatically adjusts the focus to suit the distance of an object being captured. Carrying out the autofocus function in preview mode automatically adjusts the lens position to focus.

Table 2.67

Item	Setting Parameter
Fixed-focus switch	20 (close range) to 500 (long range)
Autofocus	No settings required

Setting the property of the DirectShow relevant to the Focus Adjustment is as follows.

```
Set(CameraControl_Focus, SetValue, SetFlag)
```

Flags to set are as follows.

CameraControl_Flags_Auto : Auto focus
CameraControl_Flags_Manual : Fixed focus

Values to set for fixed focus are as follows.

20 : Short range
44 :
74 :
90 :
118 :
140 :
180 :
196 :
300 :
500 : Long range (default)

Device Exclusion Control

This is for carrying out the exclusion process for the following devices that are prohibited from concurrent use with the digital camera.

Table 2.68

Device	Excluded operation
Camera	Preview display; still image capture
CMOS Imager	CMOS Imager open

2.4.3 Image Process

This can allow the operator to specify the quality (compression ratio) of an image in JPEG.

Setting the JPEG compression ratio of the DirectShow is as follows.

```
SetQuality(SetValue)
```

Values to set are as follows.

0 : High compression ratio
1 : Middle compression ratio
2 : Low compression ratio

2.5 USB

This chapter describes about detailed specifications of the USB.

2.5.1 Basic Specifications

Switching USB

- Switches between USB Client (USB Function) and USB Host.
- Switching between USB Client (USB Function) and USB Host is carried out by a signal from the cradle. This cannot be performed in application.
- Switching is not possible while a USB device is connected to the cradle and the terminal is recognizing the USB device. Switching can be performed once the USB device is disconnected.
- **USBIsHost API** function can be used to capture the current USB Client (USB Function)/Host status.

USB Client (USB Function)

- Supports the USB 1.1 full speed.
- Communicates with "wceusbsh.dll" on PC side.
- Communication with PC can be established via ActiveSync.
- Communication with PC can be established via FLCE/LMWIN (this case, ActiveSync must be disabled.)

USB Host

- Supports the USB 1.1 full speed.
- Supports USB-MODEM/USB-LAN.
- USB device is disconnected when the terminal is suspended.
- Does not support WakeOn Ring/WakeOn LAN.
- Does not support communication via USB HUB.

USB-MODEM

- Supports the USB Communication Class (CDC: ACM).
- Communication with modem via virtual COM port can be established.
- Dial up via USB modem can be possible by selecting USB modem at the setting of connection under Windows Mobile.

USB-LAN

- Supports the HA-G62IO Ethernet Cradle.
- Can be connected to network via the TCP/IP protocol using the TCP/IP Wrapper Driver.

2.5.2 COM Port

COM ports used with the USB are as follows.

Table 2.69

USB Function	COM2
USB-MODEM	COM5

2.5.3 Product ID

USB product ID is as follows.

Table 2.70

USB Client	0x00CE

2.6 IrDA

This chapter describes about detailed specifications of the IrDA.

2.6.1 Communication Speeds

The IrDA supports the following physical communication speeds.

Table 2.71

Via	SIR	FIR
IrDA protocol	9600, 19.2K, 38.4K, 57.6K, 115.2K bps	4M bps
RAW IR	9600, 19.2K, 38.4K, 57.6K, 115.2K bps	-

Notes:

- A speed of communication via IrDA protocol is automatically determined by negotiation with the partner device.
- The maximum communication speed supported commonly by both parties (the terminal and the partner device) will be determined as communication speed.
- Communication speed cannot be set in application.

2.6.2 COM Port

COM ports used with the IrDA are as follows.

Table 2.72

IrDA protocol	COM3
RAW IR	COM4

Notes:

- When you create a communication program directly in application program to establish connection with an IrDA device, it is recommended to use IrSock APIs instead of using one of COM ports in the table above. For information about IrSock, refer to MSDN web site.
- It is not recommended to establish communication via COM3. Because severe communication control including obtaining acknowledgement whether the connection is established or not cannot be possible. If using the COM3 is inevitable, well-managed system design and thorough verification on the designed system including controlling communication at the upper layer protocol are necessary.
- The COM4 port is used to send and receive raw data directly via Infrared without using any protocol. It is used to establish connection with a device which complies with the Infrared physical layer specification but does not integrate the IrDA protocol in it. The use of this port is not recommended because that raw data is exchanged via the Infrared, there may be cases that stable communication is not carried out due to communication partner, communication speed used at the upper layer, a match of communication protocols, etc. If use of the COM4 port is inevitable, well-managed system design and thorough verification on the designed system including controlling communication at the upper layer protocol are necessary.

2.7 Bluetooth

This chapter describes about detailed specifications of the Bluetooth.

2.7.1 Basic Specifications

Version

Bluetooth® Version 2.0 + EDR

Master

The master establishes a connection with Bluetooth equipment in slave mode waiting for connection with the master.

Client (Slave)

The client (slave) becomes in waiting mode for communication initiated by the master.

Security/Encryption

This performs security (PassKey exchange) and encryption as laid down in the Bluetooth standard.

AFH

This automatically or manually limits and controls radio wave frequency band to be employed in Bluetooth communication.

Fast Connection

This is to convert radio frequency for Bluetooth communication into transmission pattern which allows connection establishment quickly.

EDR (Enhanced Date Rate)

If the communication partner supports also EDR, the EDR is set as radio wave type automatically by negotiation with the partner device. There is no setting required for the EDR mode. Communication seed via the EDR between the two terminals is approximately 500 Kbps maximum.

2.7.2 Communication Profiles

The Bluetooth profiles described in the table are supported.

Table 2.73

Function	Purpose
GAP (General Accessible Profile)	Used in the substructure segment of Bluetooth communications such as device discovery, link establishment and security.
SDP (Service Discovery Profile)	Used to search for currently usable services provided by the partner Bluetooth equipment.
Serial Profile (Client)	In Bluetooth serial communication, this is used for connection to other Bluetooth equipment.
Serial Profile (Server)	In Bluetooth serial communication, this is used for acceptance of connection request from other Bluetooth equipment.
DUN (Dial-Up Network)	This is used in dial up communication via Bluetooth mobile phone.
PAN (Personal Area Network)	This is used in network communication via Bluetooth PAN Access-Point.
OBEX Object Push Profile	This is used as easy file send and receive.
File Transfer Profile	This is used as file send and receive regulated by the Bluetooth standard.

Bluetooth communication applications and communication methods as well as profile relationships are as follows.

Table 2.74

Partner Bluetooth Equipment	Communication Application	Profile
Bluetooth mobile phone, Bluetooth modem, etc.	Dial up	DUN
Bluetooth access point (PAN Profile support)	LAN connection	PAN
Bluetooth printer	Printing to printer	Serial Profile
PC for Bluetooth + ActiveSync	Connection with host PC	Serial Profile
Between terminals, PDA that supports Bluetooth, PC that supports Bluetooth, etc.	File transfer between Bluetooth equipments	OBEX Object Push File Transfer

2.7.3 Security

This feature supports security functions laid down in the Bluetooth standard. The Bluetooth security is divided into authentication and encryption.

These are realized by the use of PassKey (otherwise known as PIN code). PassKey is a shared (common) authentication key used when forming a connection and trust relationship (bonding) with Bluetooth equipment. A maximum of 16 characters (in ASCII code) can be used, but there may be limitations on the no. of digits and usable characters due to the specifications of partner Bluetooth equipment. Also PassKey input must be done within 30 seconds from a time when PassKey input request is generated. Note that PassKey input is not required once “device trust” has been established with Bluetooth equipment in previous connection. However, the partner Bluetooth equipment must have also the trust relationship in memory.

Encryption is carried out using a link key generated after PassKey exchange and a cipher key generated from a 128-bit random number. Here, the partner Bluetooth equipment also must support the encryption. PassKey exchange is required for Bluetooth connection when encryption is set enabled.

2.7.4 COM Port

The following is the COM ports used with the Bluetooth.

Table 2.75

Serial Profile (Client)	COM6
Serial Profile (Server)	COM7
DUN (Dial-Up Network)	BTP1

Simultaneous use of multiple Bluetooth COM ports

Multiple Bluetooth COM ports cannot be opened simultaneously to use.

2.7.5 Communication Procedure

The following is the basic procedure for using Bluetooth to carry out communication.

1. **Opening the Bluetooth (Initializing)**
   This function initializes the Bluetooth using either the Bluetooth tool or the Bluetooth Library. It will turn on the power to the Bluetooth module integrated in the terminal and initialize the Bluetooth protocol stack.
2. **Searching a Bluetooth equipment**
   Searches a Bluetooth equipment using the Bluetooth tool or the Bluetooth Library. This sends out an equipment search radio wave and captures information from Bluetooth equipment operable in the vicinity.
3. **Capturing service information**
   Captures service information using either the Bluetooth tool or the Bluetooth Library. This captures the current usable service (profile) information of the partner Bluetooth equipment.
4. **Security authentication with PassKey exchange**
   The partner Bluetooth equipment may request a PassKey at a time of capturing service information and establishing Bluetooth connection. In case the Bluetooth tool is used, the same PassKey is input for both Bluetooth equipments (the terminal and the partner Bluetooth equipment) when a dialogue window appears requesting PassKey input. In case the Bluetooth Library is used, the PassKey must be set in advance by carrying out the relative functions for setting PassKey.
5. **Establishing the connection**
   Establishes a Bluetooth connection using either the Bluetooth tool or the Bluetooth Library. After the connection has been established, communication in Bluetooth can be continued using the selected profile until the connection is terminated.
6. **Terminating the connection**
   Terminates the connection using either the Bluetooth tool or the Bluetooth Library.
7. **Closing the Bluetooth**
   Closes the communication via Bluetooth either by ending use of the Bluetooth tool or by carrying out relative functions of the Bluetooth Library for closing the communication, and then turns off the power to the integrated Bluetooth module.

The functions of the Bluetooth relevant to the Communication Procedure are as follows.

BTInitialize	: Initializes Bluetooth protocol stack.
BTDeInitialize	: Closes the resource for Bluetooth protocol stack.
BTGetDeviceInfo	: Retrieves device information about Bluetooth device to be connected.
BTGetServiceInfo	: Retrieves service information for Bluetooth device that communicates.
BTSetPassKey	: Sets up PassKey.
BTConnectSerial	: Establishes connection using Bluetooth virtual serial profile.
BTDisconnectSerial	: Disconnects Bluetooth virtual serial profile.
BTConnectPAN	: Establishes connection using Bluetooth PAN profile.
BTDisconnectPAN	: Disconnects Bluetooth PAN profile.

2.7.6 Communication Procedure by Profile

While Bluetooth communication takes place, there is a chance that the communication link may be interrupted due to radio wave condition in air, so the retry process is always recommended in application to verify the communication. In general, it is recommended also that the retry process should be carried out in any wireless communication including WLAN if it takes place within the vicinity by other equipment using the same frequency band ("ISM" band) such as microwave oven.

Serial Profile

Bluetooth connection can be managed using either the Bluetooth tool or the Bluetooth Library.

The functions of the Bluetooth Library relevant to the Serial Profile are as follows.

BTConnectSerial : Establishes connection using Bluetooth virtual serial profile.
BTSendSerialData : Sends data using Bluetooth virtual serial profile.
BTReceiveSerialData : Receives data using Bluetooth virtual serial profile.
BTDisconnectSerial : Disconnects Bluetooth virtual serial profile.

DUN (Dial-Up Network)

Bluetooth connection can be managed using either the Bluetooth tool or the Bluetooth Library. The communication will take place with RAS setting using "BTP1". After the connection has been established, communication via the TCP/IP protocol is possible.

The function of the Bluetooth Library relevant to the DUN (Dial-Up Network) is as follows.

BTSelectDevice : Specifies Bluetooth device to be connected.

PAN (Personal Area Network)

Once connection to Access-Point has been established using the Bluetooth tool, communication via the TCP/IP protocol is possible.

OBEX (Object Push Profile)

File transmission or reception using the Bluetooth tool is possible.

FTP (File Transfer Profile)

File transmission or reception using the Bluetooth tool is possible.

2.7.7 Process after Communication Interruption

With Bluetooth communication, there is a chance that the communication link may be interrupted due to radio wave conditions in air. An error occurred during the communication is detected by carrying out **WriteFile API** function, **ReadFile API** function, etc.
In case where the communication is interrupted, carry out the normal Bluetooth interruption process using the Bluetooth tool or in application and then retry to establish the same connection for communication. If the normal Bluetooth interruption process is not made, unconformity in the Bluetooth stack will occur so that the lower layer is disconnected whereas the upper layer is still being connected causing the retry of establishing the connection is not possible.

2.7.8 Process During Suspend and Resume

When the terminal goes into suspend mode while Bluetooth is being used, the power to the Bluetooth module integrated in the terminal will be automatically turned off. After that, when the terminal resumes operation mode, the power to the Bluetooth module will be also turned on automatically. Once the power is turned off, all the parameters related to Bluetooth communication return to their initial states. These parameters must be set again in the Bluetooth module by initializing the Bluetooth stack. If the Bluetooth tool or the Bluetooth Library is used, it will automatically detect “suspend” and “resume” modes, and automatically initialize the Bluetooth stack.

2.7.9 Setting SR Mode Parameter

When carrying out Bluetooth communication, the connection will be established by transmitting radio waves by master Bluetooth equipment to slave Bluetooth equipment. Note that it may take time sometime to make the establishment depending on a type of the partner Bluetooth equipment. Here, by altering the SR mode parameter (used in Bluetooth connection), radio waves sent out when the master Bluetooth equipment makes the establishment will change, and may reduce the time required to establish the communication. The SR mode parameter can be set in the following registry.

[HKEY_CURRENT_USER\SOFTWARE\RXBT\HCI]

Table 2.76

Key	Setting Value	Description
DEFAULT_PAGE_SCAN_REP_MODE	dword: 0, 1, or 2	0: R0, 1: R1, 2: R2

Notes:

- Change the SR mode parameter prior to establishing Bluetooth connection.
- Even if the SR mode parameter is changed, the time required to establish connection with the partner Bluetooth equipment may not be reduced.

2.7.10 Simultaneous Use with WLAN

Since Bluetooth employs the same frequency range (2.4GHz ISM band), Bluetooth cannot be operated concurrently with WLAN. However, it is possible to make mutual interference less by following the instruction without turning off the power of either device.

- If the partner Bluetooth device supports AFH (Adaptive Frequency Hopping)
  - Separate the frequency range definitely for Bluetooth and for WLAN.
  - If AFH is used at the automatic setting mode, according to the inherent characteristics of AFH function Bluetooth causes interference to the frequency range which WLAN uses. In this case, specify the frequency range with the Bluetooth connection tool which Bluetooth should not use, in other words, the frequency range which WLAN uses.
  - Confirm that the Bluetooth device of the communication partner supports AFH function. Bluetooth connection should be established first by the terminal to the Bluetooth device. If this is carried out in the opposite way, there is possibility that AFH function does not run due to that the frequency range set by the terminal cannot be used.
  - As usable frequency range for Bluetooth is restricted by AFH function, mutual interference among Bluetooth devices or interference from other device are apt to be suffered. If the performance of Bluetooth communication ranks important, set the frequency range for Bluetooth as wide as possible. This is a matter of trade-off for WLAN.

- If the partner Bluetooth does not support AFH (exclusive use of Bluetooth and WLAN)
  - Confirm that WLAN communication has been finished before performing Bluetooth connection. If Bluetooth connection is performed while WLAN is used, radio wave from Bluetooth will significantly affect WLAN communication. Communication error by interference by Bluetooth radio wave can be reduced if Bluetooth communication is started after receiving data via WLAN.
  - Confirm that Bluetooth communication has been finished and Bluetooth connection is terminated before WLAN communication starts.
  - If another terminal fails to perform communication via WLAN/Bluetooth, keep the terminal away from this terminal as far as possible and start to operate Bluetooth again.
  - For WLAN communication to carry out, operate the terminal as close to Access-Point (for WLAN) as possible. As it is assumed that Bluetooth devices are operated near by the user, affect by interference mainly occurs on WLAN device. If the terminal distances from the Access-Point, affect by interference generated by Bluetooth device will increase causing LAN communication to fail. If this happens, place the terminal as near to the Access-Point as possible and operate WLAN communication again.

Note:
Even if either one of the methods described above has been determined to be effect, thorough check and assessment on the site and for system designs must be carried out prior to simultaneously operating Bluetooth and WLAN communications.

2.7.11 Communication Range

The communication range for Bluetooth communication between two Bluetooth devices should be 3 meters or less. If there is an obstacle exists on the path that blocks radio wave, the actual range may become shorter. Secure free path for maximum range.

2.8 WLAN

The IEEE802.11 b/g WLAN is operable with integrated WLAN module (model dependant). The IEEE802.11 b/g standard utilizes 2.4 GHz ISM ("Industry Science Medical") frequency band, which is used for short range wireless communication.

Device Name

On the terminal, the device name used to capture data, with **DeviceIoControl** function, about the WLAN driver is "SDIO86861".

2.8.1 Basic Features

Roaming

This function automatically switches Access-Point in environment where two or more Access-Points with identical SSID code exist.

Power Saving

This saves the power by automatically turning off the power to the integrated WLAN module in the terminal when communicating does not take place.

AdHoc

This operation mode provides a direct communication between wireless equipments without the use of Access-Point. Note, however, that the AdHoc mode is not recommended to operate because connection problem may occur.

WEP

This is an encryption that uses RC4 method for safe communication. It supports 40-bit (64-bit) and 104-bit (128-bit).

Enhanced Encryption

In order to address WEP vulnerabilities, the driver supports WEP key transmission, the new encryption method TKIP and the AES-developed TKIP. However, AES typically requires encoding and decoding hardware. The terminal supports AES and is compatible with WPA2.

802.1x Security

This can strengthen authentication and establish a safe and reliable communication via WLAN. In general, this interlinks with TKIP and AES. It supports PEAP-EAP-MS-CHAP-V2 and EAP-TLS.

2.8.2 Expanded Features

Power ON/OFF Control

The power to the integrated WLAN module can be controlled in application. Turning off the power when the WLAN module is not in use can save power, prevent line congestion and allow the on-board use of the terminal in aircraft. However, it is recommended to consult a cabin crew prior to use of it.

Operation Configuration File

The operation configuration file can be used to set each default value of the WLAN settings.

Resume Operation

After the terminal went into suspend mode and then returned in resume mode during wireless operation, this will automatically establish connection again with the Access-Point to enable continuous wireless communication.

Out of Range/In Range

This will automatically establish connection again with the Access-Point to enable continuous wireless communication when the terminal returns within the range from out side of the range of the Access-Point during wireless operation. This will automatically reconnect to the Access-Point if connection establishment with the Access-Point cannot be maintained due to noise or interference, or roaming is not possible for some reason.

2.8.3 Roaming

This feature automatically switches one Access-Point to another in where two or more Access-Points with the identical SSID code exist are installed.

1. Searches for Access-Points that can communicate with the terminal, and lists up radio wave status of each Access-Point.
2. Compares radio wave status of the currently connected Access-Point with those for the listed Access-Points.
3. If the comparison proves that one of the listed Access-Points has a better radio wave status than the one currently being connected with the terminal, the terminal will make a request of roaming to that Access-Point.
4. If roaming permission comes from the Access-Point to the terminal, the roaming will complete. Note that if the roaming fails, the connection establishment will be disconnected and then connected again.

Notes:

- In some cases, the Access-Point may request the terminal for forcible roaming or reconnection with another Access-Point.
- If connection establishment of the Access-Point being connected with the terminal is terminated due to some reasons such as turning off the power on it, the terminal may be forced to make a connection with another Access-Point.
- If it takes time for Access-Point to correspond for roaming request made by the terminal, the reconnection process may be initiated.
- If **DeAuthentication** or **DisAssociation** message issued by the Access-Point that is being connected with the terminal is received by the terminal after roaming completed, the connection establishment between the Access-Point and the terminal may be interrupted temporarily and then connected again.

2.8.4 Zeroconfig

This feature coordinates with the module firmware and the WLAN driver to perform some of the WLAN link management and the Network management.

- If multiple SSIDs are registered as prioritized connections, attempt to establish connection will be performed to each registered SSID. In this case, the interval of time period for reconnecting will become prolonged. If the reconnection time ranks important, register one SSID only as prioritized connection.
- Reconnection loop process will initiate when a disconnection notification is issued by the module, or when Association fails.
- The reconnection loop process will end when the terminal succeeds connection establishment with one of the multiple SSIDs registered as prioritized connections.

Connection Process

Zeroconfig will instruct the WLAN driver and the WLAN module to make connection when finding an Access-Point registered in the prioritized SSID list. Each firmware of the driver and the module both instructed initiates necessary process following the rule of IEEE802.11 b/g standard to make connection with the Access-Point. If multiple SSIDs are registered as prioritized connections in the prioritized SSID list, attempt to establish connection with each SSID will be made.

Disconnection Process

In the following cases 1 to 3, the connection establishment via WLAN with Access-Point will be disconnected. Firmware in the WLAN module judges on the disconnection and carries out the necessary roaming process.

1. When the radio wave quality in air deteriorates because of interference from other radio devices, noise, WLAN communication in the same channel with other WLAN device, or in adjacent channel.
2. When the terminal distances from Access-Point, or when radio wave weakens due to obstacle.
3. When another Access-Point that can allow roaming to avoid the poor conditions described in the situations 1 and 2 above cannot be sought.

Resume Process

The following processes are carried out when the terminal takes place in the resume mode.

- Unloading the driver
- Loading the driver
- Initializing
- Seeking Access-Point
- Creating the Access-Point list
- Establishing connection with Access-Point
- Changing the Tasktray icon

2.8.5 Channels

The no. of WLAN channels set by default at the factory is “1CH-13CH” (13 channels) compatible with the ETSI standard (EU radio standard).

2.8.6 WLAN Setting with Configuration File

The configuration file can be used to set the default values for the WLAN settings. By loading the configuration file into the terminal, setting to configure the WLAN operations can be easy.

- The configuration file is “\Documents and Settings\System Settings\WLANCFG.ini”.
- If no configuration file is available, WLAN operation is initiated with the default settings.

Timing to load the file

The timing for loading the configuration file is when a reset or a full reset is performed on the terminal. However, if any one of the following cases occurs, setting with the default values in the configuration file will not take place.

- The file itself does not exist.
- The format is wrong.
- “Disable configuration file” has been set in the WLANCFG parameter.

Creating configuration file

The configuration file can be created and edited with **WLAN Settings tool** at the Control Panel. Using a general editor, a configuration file can be also created.
WEP key must be created in advance with an encrypted character string using the **WLAN Setting tool** and then copy and paste it to the configuration file. WLAN settings made with Microsoft’s WLAN setting will be ignored in the configuration file.

File Format

The file format of configuration file is INI format which follows restrictions described below.

- The maximum size of the configuration file is 60 Kbytes.
- A line starting with ";" is regarded as comment. It does not regard as comment if located in mid-line.
- The separator for KEY and VALUE is "=". Space and tab, etc., also are included in either KEY or VALUE. If a space is inserted after "=", for example, in "SSID= tunami", the SSID value includes the space (" ")+tunami.
- At the end of line, CR/LF or CR or LF must be attached.
- The maximum length of line is 256 bytes.
- Section name, KEY and VALUE are not case-sensitive.

WLAN section

General setting for the WLAN settings is made in this section.

Table 2.77

KEY	VALUE
WLANPOWER	Set turning the power to the integrated WLAN module on or off. 1: Power ON 0: Power OFF
POWERSAVE	Set the power save mode effect selecting either value. 1: Enable the power save. 0: Disable the power save.
WLANCFG	Enable or disable the configuration file. 1: Enable the file. 0: Disable the file.
RoamingRSSILevel	Set roaming threshold value in dBm.
RoamingAvailableTime	Set time period in second to start roaming again.
RoamingRSSISpan	Set difference of roaming radio wave intensity in dBm.
BandConfig	Set communication speed selecting either value. 0: IEEE802.11b 1: IEEE802.11 b/g
MAX_SCAN_TIME	Set time period per channel in millisecond to seek Access-Point.
SCAN_CHANNELS	Set channels in successive hexadecimal codes to use. Example 123456789ABCD : Choose all channels. 16B : Choose 1Ch, 6Ch, 11Ch.

STATIC section

This section specifies parameters necessary for the integrated WLAN module to establish connection with Access-Point.

Table 2.78

KEY	VALUE
SSID	Set SSID.
ADHOC	Set Infrastructure or AdHoc mode selecting either value. 1: Infrastructure 0: AdHoc
WEP	Set WEP to be included or not. 1: Without WEP 0: With WEP
KEYINDEX	Set WEP key INDEX in the range of 0 to 3.
KEYDATA	Using the WLAN Setting tool, set encrypted WEP key data selecting either value. 20 bytes for 40-bit WEP 52 bytes for 108-bit WEP
SECURITY	Set security selecting one of the values. NONE WEP WPA WPA2
AUTH	Set authentication selecting one of the modes. OPEN PEAP TLS PSK
WEP_OPEN_KEYINDEX	Set WEP key INDEX in Open Authentication in the range of 1 to 4.
WEP_OPEN_KEY	Set WEP key.
WPA_PEAP_USER	Set user name of WPA_PEAP.
WPA_PEAP_PASS	Set password of WPA_PEAP.
WPA_PEAP_DOMAIN	Set domain name of WPA_PEAP.
WPA_PEAP_VALIDATESERVER	Set WPA_PEAP server certificate to be valid or not selecting either value. 0: Server certificate invalid 1: Server certificate valid
WPA_TLS_DOMAIN	Set domain name of WPA_TLS.
WPA_TLS_VALIDATESERVER	Set WPA_TLS server certificate to be valid or not selecting either value. 0: Server certificate invalid 1: Server certificate valid
WPA_TLS_CERTIFICATE	Set friendly name of WPA_TLS client certificate.
WPA_PSK_KEY	Set WPA_PSK key length in the range of 16 to 128 bytes.
WPA2_PEAP_USER	Set user name of WPA2_PEAP.
WPA2_PEAP_PASS	Set password of WPA2_PEAP.

Continue.

WPA2_PEAP_DOMAIN	Set domain name of WPA2_PEAP.
WPA2_PEAP_VALIDATESERVER	Set WPA2_PEAP server certificate to be valid or not selecting either value. 0: Server certificate invalid 1: Server certificate valid
WPA2_TLS_DOMAIN	Set domain name of WPA2_TLS.
WPA2_TLS_VALIDATESERVER	Set WPA2_TLS server certificate to be valid or not selecting either value. 0: Server certificate invalid 1: Server certificate valid
WPA2_TLS_CERTIFICATE	Set friendly name of WPA2_TLS client certificate.
WPA2_PSK_KEY	Set WPA2_PSK key length in the range of 16 to 128 bytes.

Examples of settings for STATIC section

Example 1; If WEP is used.

```
[STATIC]
SSID=tunami
ADHOC=0
WEP=1
KEYINDEX=0
KEYDATA= 5C1E1455A2D504920483C59EA19AC2AB3F12821273BD2A17A9BE
```

Example 2; If WEP is used.

```
[STATIC]
SSID=tunami
SECURITY=WEP
AUTH=OPEN
WEP_OPEN_KEYINDEX=1
WEP_OPEN_KEYDATA=
5C1E1455A2D504920483C59EA19AC2AB3F12821273BD2A17A9BE
```

Example 3; If WPA or PSK is used.

```
[STATIC]
SSID=tunami
SECURITY=WPA
AUTH=PSK
WPA_PSK_KEY=5C1E1455A2D504920483C5EABE
```

Example 4; If WPA or PEAP is used.

```
[STATIC]
SSID=tunami
SECURITY=WPA
AUTH=PEAP
WPA_PEAP_USER=user
WPA_PEAP_PASS=pass
WPA_PEAP_DOMAIN=domain
WPA_PEAP_VALIDATESERVER=1
```

Example 5; If WPA or TLS is used.

```
[STATIC]
SSID=tunami
SECURITY=WPA
AUTH=TLS
WPA_TLS_USER=user
WPA_TLS_DOMAIN=domain
WPA_TLS_CERTIFICATE=certname
WPA_TLS_VALIDATESERVER=1
```

TCIP/IP section

This section sets the integrated WLAN module's IP address.

Table 2.79

Key	VALUE
DHCP	Set "Enable" or "Disable" on the DHCP. If "1: Enable DHCP" is selected, the subsequent settings are not necessary to set. 1: Enable DHCP. 0: Disable DHCP.
IPADDRESS	Set IP address.
SUBNETMASK	Set subnet mask.
DEFAULTGATEWAY	Set default gateway.
DNS1	Set primary DNS server address.
DNS2	Set secondary DNS server address.
WINS1	Set primary WINS server address.
WINS2	Set secondary WINS server address.

Example ; Configuration File

```
[WLAN]
WLANPOWER=1
POWERSAVE=1
WLANCFG=1
BandConfig=1
RoamingRSSILevel=-78
RoamingAvailableTime=15
RoamingRSSISpan=1
RoamingAvailableTime=60
BandConfig=1

MAX_SCAN_TIME=105
SCAN_CHANNELS=123456789ABCDE
WLAN_CFGTOOL=WLANCONFIG

[STATIC]
SSID=tunamiAP1200imai
ADHOC=0
SECURITY=WEP=1
AUTH=OPEN
WEP_OPEN_KEYINDEX=01
KEYDATA= 5C1E1455A2D504920483C59EA19AC2AB3F12821273BD2A17A9BE

WEP_OPEN_KEY=516DFEC900486137CB9D8C82993F184B508A916F5B5E733A0159

[TCP/IP]
DHCP=0
IPADDRESS=192.168.1.100
DEFAULTGATEWAY=192.168.1.100
SUBNETMASK=255.255.255.0
DNS1=192.168.1.101
DNS1=192.168.1.102
WINS1=192.168.1.103
WINS2=192.168.1.104
```

2.9 WWAN

This chapter describes about detailed specifications of the integrated WWAN module.

2.9.1 Basic Specifications

The terminal (model dependant) supports the following communication protocols.

Table 2.80

Protocol	Remarks
GSM	Frequencies : 850, 900, 1800, 1900 MHz
GPRS	Multislot Class 12 Full PBCCH support Mobile Station Class B Coding Scheme 1-4
EGPRS (EDGE)	Multislot Class 10 Mobile Station Class B Modulation and Coding Scheme MCS 1-9
SMS	Point-to-point MT and MO

2.9.2 Available Features

Power Control

This controls the WWAN module's usage.

Data Acquisition

This acquires WWAN module information.

GPRS Communication Data

This obtains the following status data on the GPRS communication. Received signal intensity

Operator Connection Control

This enables connection to the GSM network.

- Operator list acquisition
- Operator connection method acquisition settings
- Operator data acquisition

GPRS Communication

This connects to the IP network using Dial-up or RASAPI.

Security

This protects the terminal's SIM card.

Short Message

This transmits and receives brief messages between terminals.

These features can be used via the WAN Settings tool (Control Panel Applet) and the WANGPRS Library.

Table 2.81 List of the supported features

Feature	Support
Power Control	T/L
Data Acquisition	T/L
GPRS Data Acquisition	T/L
Operator Connection Control	T/L
GPRS Communication	T/L
Security	T/L
Short Message	L

T：Tool-based support

L：Library-based support

Notes:

- The WAN Communication functions are provided by the WAN Settings tool. Refer to “WAN Settings” for detail.
- User applications can be developed to support the WAN Communication functions using the WANGPRS Library. For detail, refer to the WANGPRS Library manual.

2.10 GPS Positioning Function

This chapter describes about detailed specifications of the GPS.

2.10.1 Basic Specifications

The terminal supports the following functions that come with the integrated GPS module.

Table 2.82

	Specification	Remarks
Positioning Method	Independent positioning	Module unit receives radio waves and performs positioning
Positioning status	Reception from 4 or more satellites: 3D positioning	Positioning cannot be performed with 2 or less satellites.
	Reception from 3 satellites: 2D positioning	
Output Format	NMEA - 0183	This is the standardized output format of the National Marine Electronics Association and is the standard format used with GPS.
Geodetic System	WGS84	WGS84 is a global geodetic system built and maintained by the U.S government. This global system is suited to operate in fields requiring real-time capabilities such as the military, navigation and nautical charting.

The GPS module power source and the relevant drivers can be automatically controlled including turning on/off the power with the following terminal operations.

Table 2.83

Operation	GPS Power Source
After reset startup.	OFF
Open GPS device.	ON
Turning off while GPS is open (suspend).	OFF
Turning on while GPS is open (resume).	ON
Enable Virtual Off mode while GPS is open.	ON
Disable Virtual Off mode while GPS is open.	ON
Close GPS device.	OFF
Low battery during operation.	T.B.D.
Low battery emergency off.	OFF

2.10.2 GPS Function API

Latitude and longitude data are obtained using independent positioning to provide the following functions.

- Obtains positional data from user application via the GPS intermediate driver (Windows Mobile standard GPS interface)
- Displays satellite reception status with the GPS Information tool

Note:
Refer to “GPS Information” with the GPS Information tool for detail.

The GPS intermediate driver provides GPS information in two ways.

- NMEA Format Data Output
- Positional Data using the GPS Intermediate Driver API

In addition, multiple user applications can simultaneously access the GPS intermediate driver to obtain positional data.

NMEA Format Data Output

The NMEA is an abbreviation for National Marine Electronic Association which provides electronic instrument and communication specification standards for shipping vessels. The NMEA-0183 output protocol is a standard for GPS receiver and navigation equipment communication via a serial port. It’s widely supported by GPS equipment.

NMEA data can be output by accessing the GPS Intermediate driver’s virtual COM port (COM8).

Note:
The integrated communication port is as follows.

Table 2.84

GPS intermediate driver virtual serial port	: COM8

The procedure for using the virtual serial port is as follows.

1. Open the virtual COM port with **CreateFile()**.
2. Read the NMEA character string with **ReadFile()**.
3. Analyze the NMEA character string to retrieve the positional data.
4. NMEA character strings are continually output for each GPS Module measurement. Repeat steps 2 and 3 above as required to retrieve continuous positional data.
5. Close the port with **CloseHandle()**.

NMEA Sentence Output

The NMEA-0183 is output in text format with each item separated by a comma (,) and sentences separated by a new line code (CRLF). The checksum is added up at the line end. The checksum calculates the XOR'ed value of character data enclosed by $, ' and * in hexadecimal string values.

Table 2.85

$	Sentence-identifying character	, value (, value)…	*Checksum	CRLF

Multiple sentence types are defined.

Some data containing broken sentences may be read depending on when the GPS is opened and read. NMEA sentence data can be properly interpreted use programming procedures such as those listed below.

- Detect head of sentence using $ character.
- Detect end of sentence using line break (CRLF) code.
- Discard broken sentences verified with checksum.

GGA Sentences

This displays GPS fix data.
Example of output:
$GPGGA,095635.00,3540.05802,N,13921.63542,E,1,06,1.54,212.5,M,39.2,M,,*59

Table 2.86

Item	Description	Validity
$GPGGA		Yes
095635.00	UTC time is displayed in the hhmmss.ss format.	Yes
3540.05802	Displays latitude. The value at the left shows a longitude of 35 degrees and 40.05802 minutes.	Yes
N	N and S indicate north and south respectively.	Yes
13921.63542	Displays longitude. The value at the left shows a longitude of 139 degrees and 21.63542 minutes.	Yes
E	E and W indicate east and west respectively.	Yes
1	Indicates GPS accuracy. 0 = no signal 1 = independent positioning	Yes
06	Indicates the number of satellites from which a signal is being transmitted.	Yes
1.54	Shows HDOP. The HDOP is the GPS coefficient of horizontal dilution. The smaller this value becomes, the more accurate the position.	Yes
212.5	Indicates the altitude above sea level.	Yes
M	Altitude unit: M = meters	Yes
39.2	Indicates the altitude from the WGS 84 Ellipsoid.	Yes
M	Altitude unit: M = meters	Yes
	Age of D-GPS data (seconds)	No
	DGPS base station ID number.	No
*59	Checksum	Yes

Note:
“Yes” indicates the presence of the valid output.
“No” indicates the absence of the valid output.

GSA Sentences

This outputs GPS DOP and active satellite data.
Example of output:
$GPGSA,A,3,13,17,28,04,02,23,,,,,,,2.38,1.54,1.82*09

Table 2.87

Item	Description	Validity
$GPGSA		Yes
A	Positioning mode A = 2D/3D auto-select M = 2D/3D manual-select	Yes
3	Positioning status 1＝no signal 2＝2D 3＝3D	Yes
13,17,28,04,02,23, , , , , , ,	Satellites from which signal is being transmitted. Displays up to 12 satellites.	Yes
2.38	Shows PDOP. The PDOP is the coefficient of position dilution determined by the position of the GPS satellite/s. The smaller this value becomes, the more accurate the position.	Yes
1.54	Shows HDOP. The HDOP is the GPS coefficient of horizontal dilution. The smaller this value becomes, the more accurate the position.	Yes
1.82	Shows VDOP. The VDOP is the GPS coefficient of vertical dilution. The smaller this value becomes, the more accurate the position.	Yes
*09	Checksum	Yes

Note:
“Yes” indicates the presence of the valid output.
“No” indicates the absence of the valid output.

GSV Sentences

This outputs data on GPS Satellites in View.
GSV sentences show current data on the satellites from which a signal can be received. A single sentence contains data up to four satellites. Data on the fifth and subsequent satellites is output in multiple lines. In the example below, data is provided on eight satellites in two sentences.
Example of output:
$GPGSV,2,1,08,13,22,148,16,17,78,326,33,28,31,209,29,04,39,289,46*73
$GPGSV,2,2,08,11,26,083,21,20,51,047,,02,06,274,40,23,34,111,32*7F
The first sentence contains the following information.

Table 2.88

Item	Description	Validity
$GPGSV		Yes
2	Total message count	Yes
1	Message no.	Yes
08,	No. of satellites from which signal can be transmitted	Yes
13	Satellite no.	Yes
22	Elevation (degrees)	Yes
148	Direction (degrees)	Yes
16	Indicates the signal-to-noise ratio (SNR; dB) when receiving a signal. The higher the ratio, the better the signal.	Yes
Items 5 to 8 repeated 0 to 3 times		
*73	Checksum	Yes

Note:
“Yes” indicates the presence of the valid output.
“No” indicates the absence of the valid output.

RMS Sentences

This outputs data on the Recommended Minimum.
Example of output:
$GPRMC,095636.00,A,3540.05781,N,13921.63500,E,0.851,193.03,011107,,,A*62

Table 2.89

Item	Description	Validity
$GPRMC		Yes
095636.00	UTC time is displayed in the hhmmss.ss format.	Yes
A	Indicates status: A = data is valid. V = data is invalid during measurement.	Yes
3540.05781	Displays longitude. The value at the left shows a longitude of 35 degrees and 40.05781 minutes.	Yes
N	N and S indicate north and south respectively.	Yes
13921.63500	Displays longitude. The value at the left shows a longitude of 139 degrees and 21.63500 minutes.	Yes
E	E and W indicate east and west respectively.	Yes
0.851	Indicates ground speed (knots).	Yes
193.03	Indicates traveling direction (degrees).	Yes
011107	Shows the date (UTC) as ddmmyyyy.	Yes
	Geomagnetic variation (degrees).	No
	Indicates the direction of geomagnetic variations as a single letter, i.e. N, S, E or W.	No
A	Indicates positioning mode: A = independent positioning D = DGPS N = invalid	Yes
*62	Checksum	Yes

Note:
“Yes” indicates the presence of the valid output.
“No” indicates the absence of the valid output.

Positioning Data Using the GPS Intermediate Driver API

The Windows Mobile GPS intermediate driver provides an API to analyze NMEA character strings and obtain positioning data.

The GPS intermediate driver API can be used in the following procedure.

1. Create an event with **CreateEvent()** in order to detect GPS module status changes and output.
2. Connect to the GPS module with **GPSOpenDevice()**. GPS module status and positional changes can be registered for each event with **GPSOpenDevice()**. "Positional change" events actually indicate that NMEA output from the GPS module has been received. The GPS module generally outputs several lines of NMEA character strings each second.
3. Use WaitForMultipleObjects() or WaitForSingleObject() to wait for events.
4. When notification of a "positional change" is received, use **GPSGetPosition()** to retrieve the data. Positioning data can be retrieved from each member inside the GPS_POSITION structure. Some of the structural members are listed in the table below.

Table 2.90

Member	Format	Contents
DwValidFields	DWORD	The validity or invalidity of retrieved data is shown in Bits for each GPS_POSITION structural field.
stUTCTime	SYSTEMTIME	UTC time retrieved from the satellites is shown in SYSTEMTIME format.
dblLatitude	Double	Latitude is expressed in degrees. A positive value indicates northern latitude.
dblLongitude	Double	Longitude is expressed in degrees. A positive value indicates an eastern longitude.
flSpeed	Float	Traveling speed is shown in knots (nautical miles/hour)
flHeading	Float	Traveling direction is expressed in degrees. 0° represents true north.
FixType	GPS_FIX_TYPE	GPS measurement is shown in either 2D or 3D.

5. Repeat steps 3 and 4 as required by the application.
6. When positioning data is no longer required, the connection can be terminated with **GPSCloseDevice()**.

Figure 2.13 shows the flowchart of the procedure.

Note:
Depending on the design of application, it may also be possible to retrieve regular positioning data with **GPSGetPosition()** and status with **GPSGetDeviceState()** after opening the device with **GPSOpenDevice()** without having to register events.

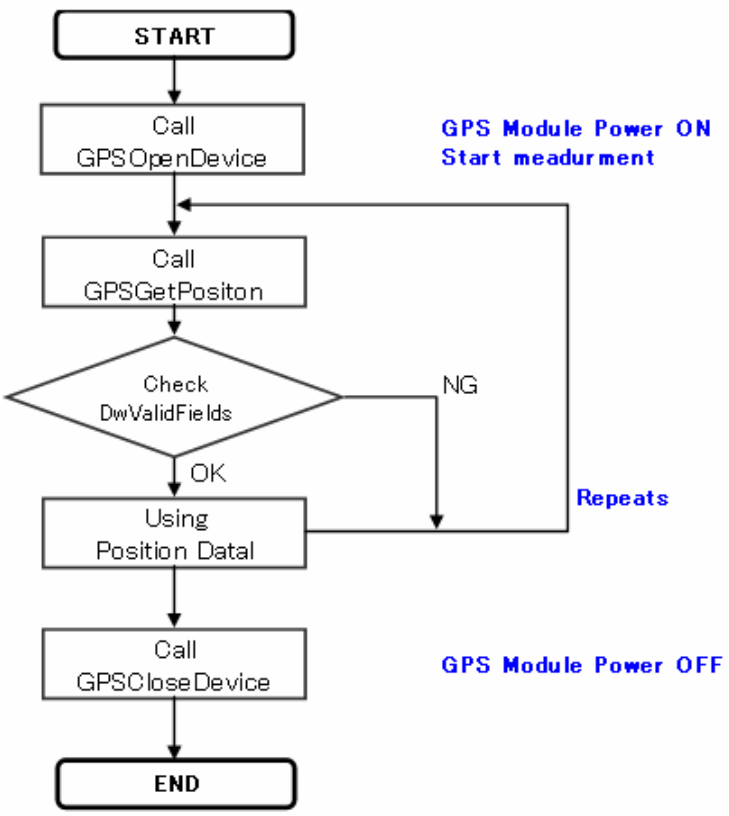


Figure 2.13

List of the Functions

The functions which can be used with the GPS intermediate driver API are listed below.

Table 2.91

Function	Description
GPSCloseDevice	Closes the GPS intermediate driver and connects to the GPS device.
GPSGetDeviceState	Retrieves the status of the GPS module.
GPSGetPosition	Retrieves GPS positioning data.
GPSOpenDevice	Opens the GPS intermediate driver and connects it to the GPS device.

Note:

The terminal does not support the GPS Intermediate driver's **DeviceIOControl** function.

2.11 Power Control

This chapter describes about detailed specifications of the power controls.

2.11.1 Monitoring Low Voltage

Four levels of the low voltage monitor control are provided for the terminal.

Table 2.92

	Description	Action	Next Startup
VDET1	Warning against low voltage of the battery pack	Issues warning message for low voltage of the battery pack.	-
VDET2	Turning off the power due to low voltage of the battery pack	Turns off the power.	Resume (with warning at time of startup)
VDET3	Emergency turning off the power due to low voltage of the battery pack	Forces the terminal to turn off the power.	Warm boot (with warning at time of startup)
VDETCF	Turning off the power due to low voltage of card	Turns off the power.	Resume (with warning at time of startup)

Battery Pack

The following shows statuses and levels available for the battery pack.
Normally the battery status is checked once every five seconds. Taking last immediate ten data of the power voltage from AD converter, its average is calculated to classify the status into three levels, either “Almost exhausted (10% of the capacity or less)”, “Low (30% of the capacity or less)”, “O.K. (30 % of the capacity or more)”. When VDET1 occurs, the level is at 10% of the capacity.

Table 2.93

Status/Level		Notation	Description
Status	External	External power	Power via AC Adaptor is being supplied, and charging the battery pack is complete.
	Recharge	Recharging	Power via AC Adaptor is being supplied, and charging the battery pack continues.
	Normal	Main battery	Operating power by the battery pack is being supplied.
Level	1	O.K.	The battery pack has been fully charged or has a sufficient capacity.
	2	Low	The battery voltage level is at 30% or less.
	3	Almost exhausted	The battery voltage level is at 10% or less.

Memory Backup Battery

The following shows levels available for the memory backup battery.
The terminal's system checks the status of the backup battery every five minutes. Since power source of charging the memory backup battery is supplied by the battery pack, charging it may not be carried out sufficiently if the battery pack has not been accommodated for a long period or is not being fully charged. In other words, the memory backup battery will be normally charged if the battery pack has a sufficient level of battery capacity. Prior to operating the terminal, be sure that the memory backup battery is charged fully; otherwise the RAM content may not be held when the battery pack is demounted.

Table 2.94

Level	Notation	Description
1	O.K.	The memory backup battery has been fully charged or has a sufficient capacity.
2	Almost exhausted	The level of the memory backup battery capacity is at 10% or less.

User Notification Methods

The terminal's system issues a WM_POWERBROADCAST message when the battery pack or memory backup battery runs down into "Almost exhausted" state. Detail of the message is as follows:

Table 2.95

Battery	Message	wParam	lParam	Interval of notification
Battery Pack	WM_POWERBROADCAST	PBT_APMBATTERYLOW	0	5 seconds
Memory backup Battery	WM_POWERBROADCAST	PBT_APMOEMEVENT	SUBBATTERYLOW	5 minutes

```
#define WM_POWERBROADCAST   0x0218
#define PBT_APMBATTERYLOW   0x0009
#define PBT_APMOEMEVENT     0x000B
```

When the status of the memory backup battery is detected, the following value is set in the ***lParam*** parameter.

```
#define SUBBATTERYLOW       0x200
```

The status of both battery pack and memory backup battery can be monitored with Microsoft's **GetSystemStatusEx2() API** function in your application to retrieve the status values described in the table.

Table 2.96

Member	Description	Returned Value
ACLineStatus	Retrieves the status of AC power.	AC_LINE_OFFLINE : AC power is off. AC_LINE_ONLINE : AC power is on.
BatteryFlag	Retrieves the status of battery pack.	BATTERY_FLAG_HIGH : OK BATTERY_FLAG_LOW : Low BATTERY_FLAG_CRITICAL : Almost exhausted. BATTERY_FLAG_CHARGING : Under charging
BatteryLifePercent	Retrieves the remaining capacity of battery pack every 10% level.	In the range of 10 to 100%
BackupBatteryFlag	Retrieves the status of memory backup battery.	BATTERY_FLAG_HIGH : OK BATTERY_FLAG_LOW : Almost exhausted
BatteryChemistry	Retrieves the type of the operating battery, either battery pack or dry-cell battery (see note).	BATTERY_CHEMISTRY_LION : Battery pack BATTERY_CHEMISTRY_ALKALINE : Dry-cell battery

Note:
Dry-cell batteries are not usable with the DT-X30 series handheld terminals.

2.11.2 Power ON Factors

The following is the power ON factors. These factors can be set enabled or disabled using the System Library.

Power ON Factors

- The Power key is pressed while the power is off.
- A time period set for the Alarm function elapsed.
- The terminal is mounted on cradle while the power is being supplied by AC Adaptor via the cradle.
- Trigger key is pressed.
- Reset switch on the back of the terminal is pressed.

The functions of the System Library relevant to the “Power ON Factors“ are as follows.

SysSetBootup : Sets up “Enable” or “Disable” for turning on the power.
SysGetBootup : Retrieves “Enabled” or “Disable” status for turning on the power.

Power ON Disable Factors

Factors that do not allow turning on the power are as follows.

- When the battery pack’s voltage level is not sufficient enough to start up the terminal (VDET2 level or less).
- The battery cover lock switch (at the battery compartment) is open.

2.11.3 Power OFF Factors

The following is the power OFF factors.

- The Power key is pressed while the power is on.
- Neither key input, disk access, nor communication is performed within a preset time period.
- Output voltage from the battery pack is low (VDET2, VDET3) (see note below).
- The battery cover lock switch is open.
- Internal temperature in the terminal exceeds the limit set by the system (see note below).

Note:
The warning message appears a next time when the power is turned on.

Power OFF Time

When either VDET2, BCVR, VDETCF, or VDET3 occurs, the power is turned off after the respective time periods elapse.

Table 2.97

VDET2	Turning off (resume OFF) the power after 200 milliseconds.
BCVR	
VDETCF	
VDET3	Forced to turn off the power after 200 microseconds. When the power is turned on next time, VDET3 is reset.

2.11.4 Controls on Power Key

Time period after pressing down the Power key

It takes approximately one second for the system to recognize turning on or turning off the power after the Power key is pressed down.

Disable Power Key after Turning On the Power

After turning on the power, the Power key is set disabled for a certain period of time. This prevents turning off the power while various drivers are being loaded. This time period can be set with the System Library.

The functions of the System Library relevant to the “Disable Power Key after Turning on the Power“ are as follows.

SysSetOffMaskTime : Sets up a period of time for disabling turning off the power.
SysGetOffMaskTime : Retrieves time period set for disabling turning off the power.

Disable Power Key after FlashDisk Is Accessed

After the FlashDisk is accessed, the Power key will be set disabled for a certain period of time. This prevents turning off the power while the FlashDisk is being accessed. This time period can be set with the System Library.

The functions of the System Library relevant to the “Disable Power Key after FlashDisk Is Accessed“ are as follows.

SysSetStorageOffMaskTime : Sets up a period of time for disabling turning off the power after the use of storage.
SysGetStorageOffMaskTime : Retrieves time period set for disabling turning off the power after the use of storage.

Disable Turning Off the Power

It is possible to disable turning off the power with the Power key using the System Library. This feature can be applicable to the cases below.

- Need to disable turning off the power with the Power key for a certain period of time.
- If application must be closed before the system turns off the power.

If the Power key is pressed down while the Power key is set disabled, the system broadcasts a message, WM_POWERBROADCAST (PBT_APMSUSPEND), to application software without turning off the power. The message is issued only once when the Power key is pressed for the first time after the “Disable Turning Off the Power” has been set enabled.

The functions of the System Library relevant to the “Disable Turning Off the Power” are as follows.

SysDisablePowerOff : Sets up “Disable” for turning off the power on the terminal.
SysEnablePowerOff : Sets up “Enable” or “Disable” for turning off the power on the terminal.
SysGetPowerOff : Retrieves “Enable” or “Disable” status for turning off the power on the terminal.

2.11.5 Power Saving

Idle

The power is saved by putting the CPU into **idle state** when event standby status is detected by either the terminal or application running on the terminal. The peripheral devices are in operating state while the CPU is in the idle state.

Auto Power OFF (APO)

The power is automatically turned off ("APO") if no key input, no disk access, or no communication is made during a preset time period. Setting the APO function enabled or disabled, and a time period to activate the function can be performed using the System Library.

The functions of the System Library relevant to the Auto Power OFF (APO) are as follows.

SysDisableAPO : Sets up "Disable" for turning off the power automatically.
SysEnableAPO : Sets up "Enable" for turning off the power automatically.
SysGetAPO : Retrieves "Enable" or "Disable" status for turning off the power automatically.

Dimming and ABO (Auto Backlight OFF)

The backlight is automatically dimmed or turned off if no key input, no disk access, no communication, and etc., is made during the preset time period. Setting a time period before starting dimming or turning off the backlight (Auto Backlight OFF), and "Enable" or "Disable" on the dimming and the Auto Backlight OFF functions can be set at the Control Panel.

CPU Clock Frequency Control

The CPU clock frequency is changed to one of the frequencies described in the following table depending on the CPU load or user designation. It can be changed at the Control Panel or using the System Library. The default is "AUTO". Note however that the CPU frequency is not changed to 13 MHz in the Auto mode if WLAN operation has been set effect.

Table 2.98

Mode	Frequency
POWERSAVE	208 MHz
NORMAL	312 MHz
TURBO	624 MHz
AUTO	Automatically changes frequency to 104, 208, 312, 624, or 60 MHz depending on the CPU load.

The functions of the System Library relevant to the "CPU Clock Frequency Control" are as follows.

SysSetCPUMode : Sets up the CPU frequency control.
SysGetCPUMode : Retrieves the status of the CPU frequency control.
SysSetDefaultCPUMode : Returns the CPU speed setting to the factory default.

Virtual Power OFF/WLAN Standby

This is standby mode for WLAN operation. The System Library is used in application to turn off the LCD, keys and set the CPU frequency to “POWERSAVE” mode to save the power. Other peripheral devices are in operating state.

Table 2.99

Display	OFF
KEY	Lock
APO	Prohibit
Turning off the power with the Power key	Prohibit
CPU clock frequency	POWERSAVE

2.11.6 CPU Power State Control

The following shows the power states operable on the terminal.

Table 2.100

State		Contents
Discharge		State in that the battery pack and the super capacity have been discharged. Neither content in the RAM nor the RTC is backed up.
RTC backup		State in that only the RTC is being backed up. The content in the RAM is not backed up.
SLEEP mode		State in that the power on the terminal is turned off, and peripheral devices are also turned off. The RTC and the content in the RAM are backed up.
RUN mode		State in that the terminal is running or application is running on the terminal.
	POWERSAVE	The CPU is running at 208 MHz.
	NORMAL	The CPU is running at 312 MHz.
	TURBO	The CPU is running at 628 MHz.
	AUTO	The CPU is running at either 104, 208, 312, 624, or 60 MHz depending on the CPU load.
IDLE mode		State in that the terminal or application is waiting for an event to occur.
	DeepIdle	If the CPU clock frequency has been set to “AUTO” mode, and the backlight is turned off, the CPU runs at 13MHz (“DeepIdle” mode). Note however that the CPU will be in ordinary “Idle” state, not DeepIdle mode, if periodical accesses are made to the integrated WLAN module.

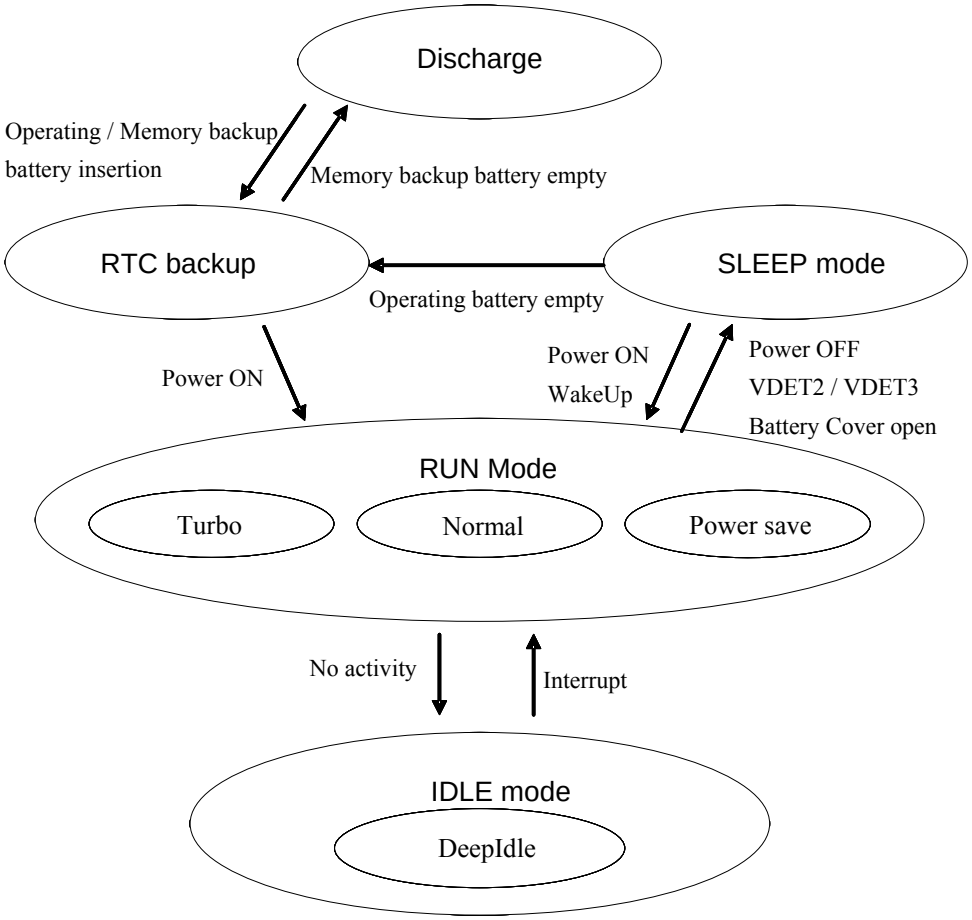

Discharge
Operating / Memory backup
battery insertion
Memory backup battery empty
RTC backup
SLEEP mode
Operating battery empty
Power ON
Power ON
WakeUp
Power OFF
VDET2 / VDET3
Battery Cover open
RUN Mode
Turbo
Normal
Power save
No activity
Interrupt
IDLE mode
DeepIdle

Figure 2.14

2.11.7 Virtual OFF by Application

Virtual OFF

The Virtual OFF is a function and its main object is to save power. Internally, the terminal is running normally but it seems to be with the power being turned off – unable to display and input a key. This function is mainly used to provide the terminal user with fast resume from standby state in WLAN communication.

Virtual OFF State Transition

The state transition diagram of Virtual OFF is below. The system has a mode named Virtual OFF and the state transits ON State and OFF State in the mode. The transition is triggered by the message issued by pressing the Power key.

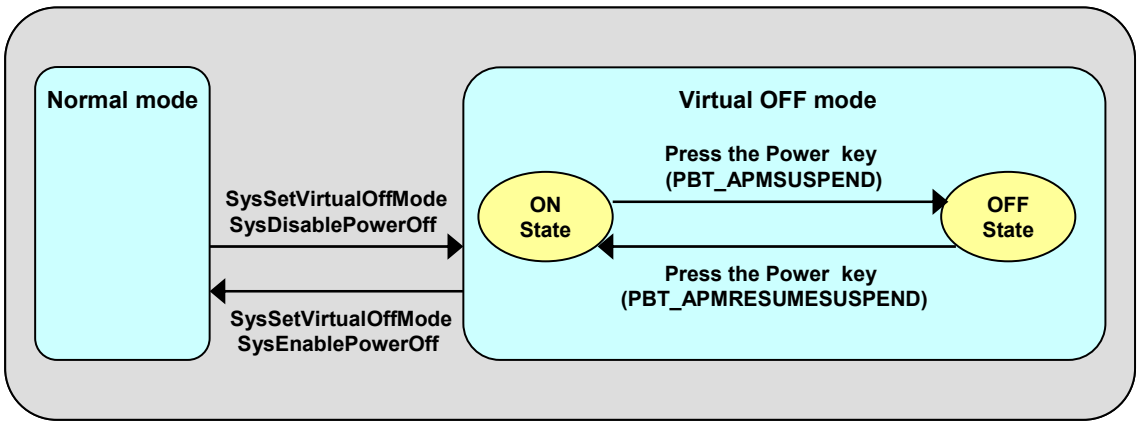


Figure 2.15

How to Set Virtual OFF Mode in Application

In order to set the Virtual OFF mode, call **SysSetVirtualOffMode** and **SysDisablePowerOff** functions of the System Library. In this mode, the Power Management alternately issues the following messages every time the Power key is pressed.

1. When the Power key is pressed to turn off the power:
   WM_POWERBROADCAST (PBT_APMSUSPEND)

2. When the Power key is pressed to turn on the power:
   WM_POWERBROADCAST (PBT_APMRESUMESUSPEND)

In the diagram in Figure 2.17, the application receives PBT_APMSUSPEND message at the first press of the Power key and then changes the state to OFF State in the Virtual mode. And then the application receives PBT_APMRESUMESUSPEND message and returns to ON State.
The application undertakes the transition to OFF State in the Virtual OFF mode. For example, the application disables display, key input, and etc. and turns off the power to devices in idle.

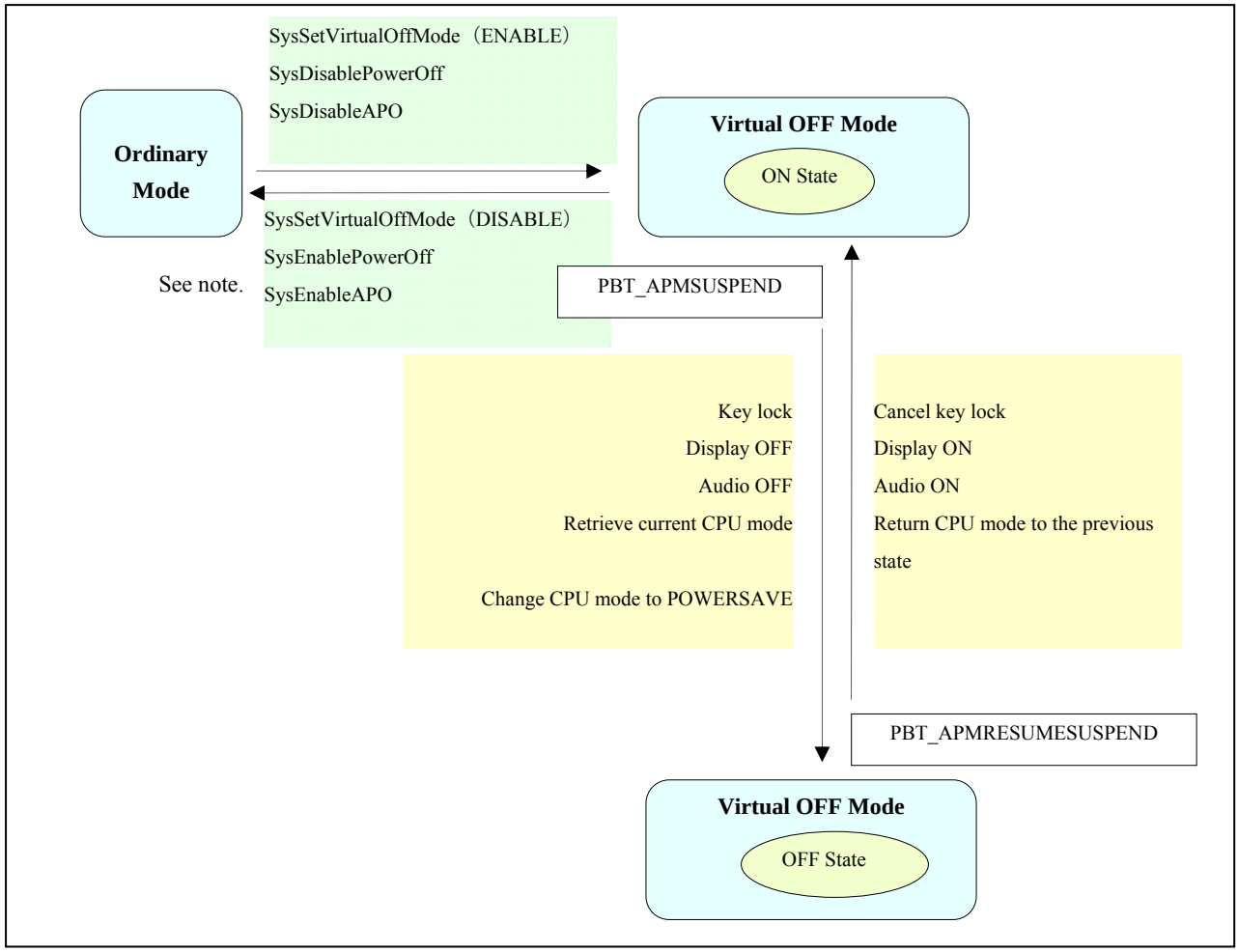


Figure 2.16

Notes:

- If the application receives the low battery warning message (PBT_APMBATTERYLOW), the application should reset the Virtual OFF mode and warn the user of low battery. If the user continues to operate the terminal ignoring resetting the Virtual OFF mode, turning off the power will occur (ordinal process to turn off the power) due to low voltage of the battery. This causes a confusion and makes the user unable to judge whether the terminal cannot resume from the Virtual OFF mode or troublesome caused by the battery ran out.
- During the Virtual OFF mode, if low battery or turning off the power by opening the battery cover lock switch occurs, there will be discrepancy between the expected condition the application assumes at the next time of starting up and actual condition. For turning off the power in ordinary process, the discrepancy is caused by two kinds of setting, one should be reset and the other to be saved. These settings must be set to ON state again in the Virtual OFF mode when the application receives the Power On message (PBT_APMRESUMESU|SPEND).

2.11.8 Virtual OFF by System

The “Virtual OFF” explained in Chapter 2.11.7 and adopted in the past for the CASIO previous models is controlled by application. The DT-X30 and new coming models in future will support a new virtual off mode - Virtual OFF by the System. The Virtual OFF by application is set in ON state of the ordinary condition and is controlled by the System Library in application.
In the following figure, the application enables the “Virtual OFF by System” with Microsoft’s **SysSetSystemManagedVirtualOffMode** function. Once the mode is set effect, the system alternately changes ON and OFF states of the Virtual OFF mode every time the user presses the Power key. That is to say, each device driver can automatically go into the pre-determined device state. The “Virtual OFF by System” can be reset by a reset operation.

Transition of Power Management (for application)

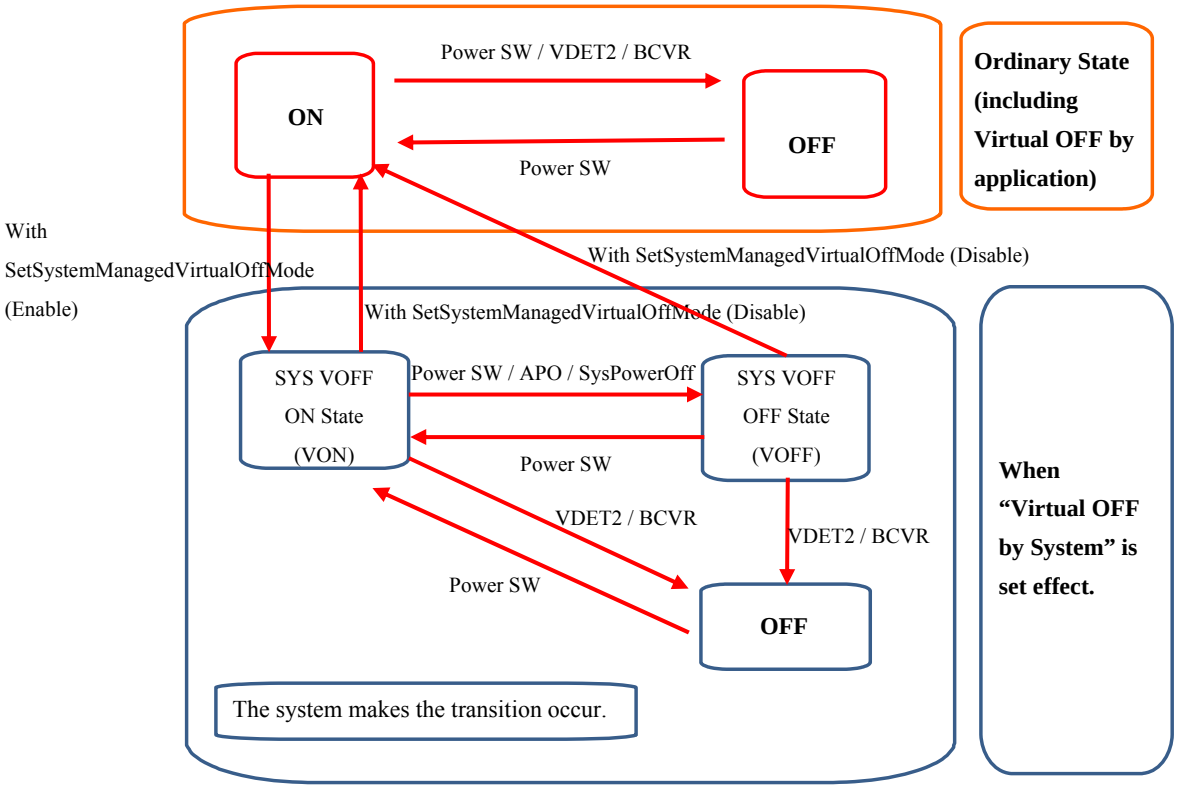


Figure 2.17

In the above figure, if the application receives the low battery warning message (PBT_APMBATTERYLOW), the application should reset the Virtual OFF mode and warn the user of low battery. If the user continues to operate the terminal ignoring resetting the Virtual OFF mode, turning off the power will occur (ordinal process to turn off the power) due to low voltage of the battery. This causes a confusion and makes the user unable to judge whether the terminal cannot resume from the Virtual OFF mode or troublesome caused by the battery ran out.

Note:
Each device goes into the following state in the Virtual OFF.

Table 2.101

Device	Operation	Device	Operation
Display	Not operable	Audio	Not operable
Key	Not operable	Buzzer	Not operable
WLAN	Operable	Vibrator	Not operable
Bluetooth	Operable	LED	Operable
IrDA	Operable	FlashDisk	Operable
USB	Operable	CPU	at 104MHz
Scanner	Operable		

2.11.9 Charging/Supplying the Power

The optional Dual Battery Charger (HA-G32DCHG) can be used to charge battery packs (two at a time). Mounting the terminal on USB Cradle (HA-G60IO), Cradle-type Battery Charger (HA-G30CHG), or Ethernet Cradle (HA-G62IO) allows charging the battery pack while it is installed in the terminal and supplying the power to the terminal.

2.11.10 Temperature Control

If temperature rise is detected in the terminal when running at the highest clock frequency (under such the condition that the CPU speed at “TURBO”, the integrated WLAN module in active mode, etc.), a warning message (see Figure 2.18) appears and the power is turned off to protect the integrated devices in the terminal.

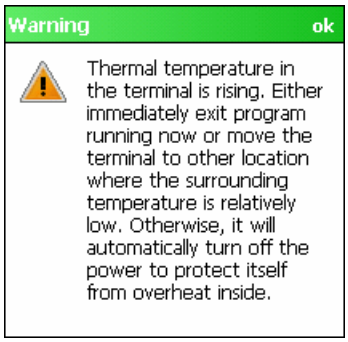

Warning
ok
Thermal temperature in the terminal is rising. Either immediately exit program running now or move the terminal to other location where the surrounding temperature is relatively low. Otherwise, it will automatically turn off the power to protect itself from overheat inside.

Figure 2.18

Either turn off the power and leave the terminal unused for a while or move the terminal to a location where the surrounding air temperature is cooler.
If the power is turned off due to the temperature limit, a warning message (see Figure 2.19) appears when the power is turned on a next time.

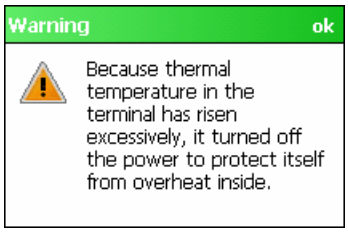

Warning
ok
Because thermal temperature in the terminal has risen excessively, it turned off the power to protect itself from overheat inside.

Figure 2.19

2.12 Security

This chapter describes about detailed specifications of the security.

2.12.1 Setting Password for Terminal

This is the password setting implemented in the Windows Mobile models (model dependant). Your password can be set at the Control Panel. Click the **Lock** icon to initiate the **Password Settings** screen, and then enter your password in each field.

2.12.2 Setting Individual ID

Individual ID is written into a predetermined area in the FlashDisk at time of shipping from the factory. Distributor code (a code used to protect distributor developed software from illegal copying by an unauthorized party) is saved in other area different from the individual ID. The individual ID incorporates the product code and serial number etc. and always becomes a unique code different from other units of the DT-X30 series. The System Library can be used to read the individual ID set on each unit of the terminal.

The function of the System Library relevant to the “Setting Individual ID” is as follows.

SysGetDeviceIDCode : Retrieves Device ID.

2.12.3 Setting Distributor ID

The individual ID and distributor ID can be used by the distributor and user to prevent illegal use of application by an unauthorized party at a time of installing or carrying out the illegally copied application by checking these preset codes. The distributor code is saved in the FlashDisk area, and read using the System Library.
Set up your individual ID with the ID setting tool that can be downloaded from the CASIO web site.

The function of the System Library relevant to the “Setting Distributor ID“ is as follows.

SysGetUserIDCode : Retrieves User ID.

3. Control Panel Applets

The Control Panel applets are programs that display the content of the various parameters for the terminal itself and to change the settings.

Note:
Different from the Windows CE models, the terminology - Control Panel - is not used for the Windows Mobile models. However, in this reference manual application program which is initiated by navigating to **Start** → **Settings** is called “Control Panel applet”.

The Control Panel has three tabs. The applets in each tab are listed in the following tables. See Tables 3.1 to 3.3.

Table 3.1 Personal Tab

Name	Description	CASIO	MS
Buttons	Changes the parameters concerned with operations by the keyboard.	--	Yes
Input	Changes the text input method.	--	Yes
Lock	Changes owner password and security options.	--	Yes
Menus	Changes the program shortcuts that appear in the Start menu.	--	Yes
Owner Information	Changes owner’s personal profile.	--	Yes
Sounds & Notifications	Sets up type and its sound volume.	--	Yes
Today	Customizes the Today screen.	--	Yes

Table 3.2 System Tab

Name	Description	CASIO	MS
About	Displays system information.	--	Yes
Backlight	Changes the backlight brightness.	--	Yes
Buzzer	Sets up buzzer sound volume.	Yes	--
Certificates	Displays the terminal's digital certificate.	--	Yes
Clock & Alarms	Changes the date, time, and alarm settings.	--	Yes
CPU Speed	Sets up the CPU's clock frequency.	Yes	--
Customer Feedback	Enables Customer Feedback possible.	--	Yes
Encryption	Enables the terminal to encrypt files in storage card.	--	Yes
Error Reporting	Enables the terminal to issue Error Report.	--	Yes
External GPS	Sets up the GPS device.	--	Yes
Imager Setting	Changes the Imager settings.	--	--
Managed Programs	Displays the information about installed programs.	--	Yes
Memory	Displays the usage of main memory and storage card memory.	--	Yes
Power	Changes the power management options.	--	Yes
Regional Settings	Changes display methods of numeric value, currency, date and time.	--	Yes
Remove Programs	Deletes application program installed in the terminal.	--	Yes
Scanner Setting	Changes Laser Scanner settings.	--	--
Screen	Switches the screen orientation. Realigns the touch screen. Increases or decreases the size of text on the screen.	--	Yes
Task Manager	Switches to a running program. End a running program.	--	Yes
USB Connection	Checks USB connection status.	Yes	--
Version Info	Displays the terminal version information.	Yes	--
Windows Update	Keeps the terminal's operating system up to date.	--	Yes

Table 3.3 Connections Tab

Name	Description	CASIO	MS
Beam	Enables the terminal to receive all incoming beams.	--	Yes
Bluetooth	Carries out connection establishment with Bluetooth device.	Yes	--
Connections	Connection Manager	--	Yes
Domain Enroll	Controls the terminal to your network.	--	Yes
Network Cards	Configures network adapters.	--	Yes
USB to PC	Enables advanced network functionality.	--	Yes
WAN Settings	Sets up the power for WAN and the parameters required for WAN configuration.	Yes	--
Wireless Manager	Enables or disables network devices.	--	Yes
Wireless Configuration	Configures wireless network adapters.	--	Yes
WLAN Power	Sets up the powers for WLAN.	Yes	--
WLAN Settings	Sets up the parameters required for WLAN configuration.	Yes	--

3.1 Buttons

This applet is for setting parameters concerned with operations with the keyboard.

Program Buttons Tab

This tab is for reassigning a program to a key.

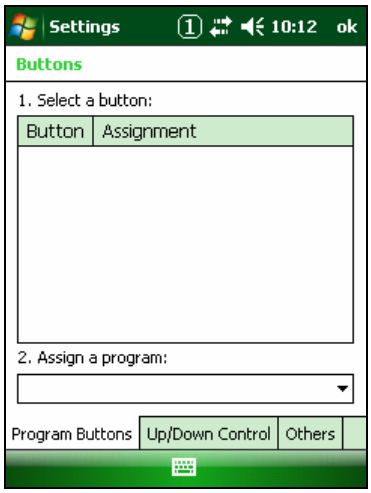


Figure 3.1

Note:
The DT-X30 has no keys for program assignment. You cannot assign a program to a key in this applet.

Up/Down Control Tab

This tab is for specifying the key repeat rate.

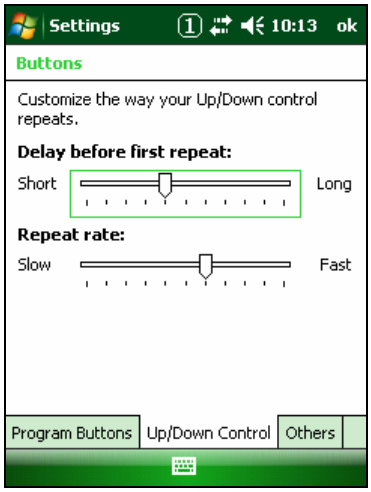


Figure 3.2

Delay before first repeat

This adjustable slide is to set a waiting time period until when repeating key entry starts.

Repeat rate

This adjustable slide is to set an interval between repeating key entries.

Others Tab

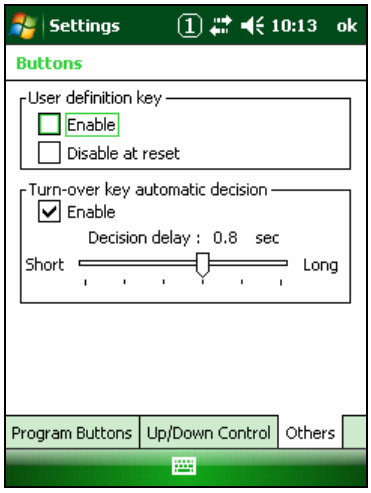


Figure 3.3

User definition key

Specifies “Enable” or “Disable” for the user definition key.

Turn-over key automatic decision

Specifies “Enable” or “Disable” for the turn-over key automatic decision. If “Enable” is chosen, sets a period of time to wait for the decision delay.

3.2 Input

This applet is for changing the current input method and options.

Input Method Tab

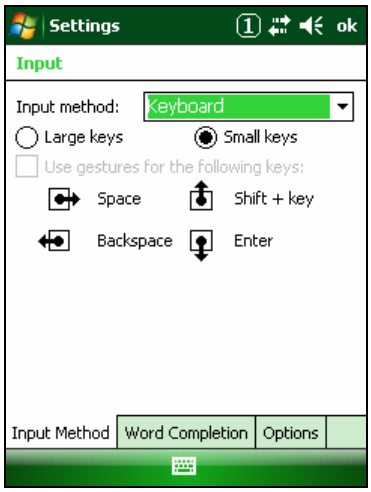


Figure 3.4

To change the input method, select a favorite method in the **Input method** pull-down menu. The Windows Mobile® models have the four input methods.

Block Recognizer	:	Use a single stroke to write letters, numbers, symbols, and punctuation, which are then converted into typed text. Do gestures to enter Return and Backspace.
Keyboard	:	Tap keys on the keyboard displayed on the screen to enter text.
Letter Recognizer	:	Write individual letters, numbers, and punctuation, which are converted into typed text.
Transcriber	:	Write in cursive, print, or mixed handwriting (consisting of both cursive and print), and convert your writing into typed text.

Word Completion Tab

This tab is for setting the word completion feature.

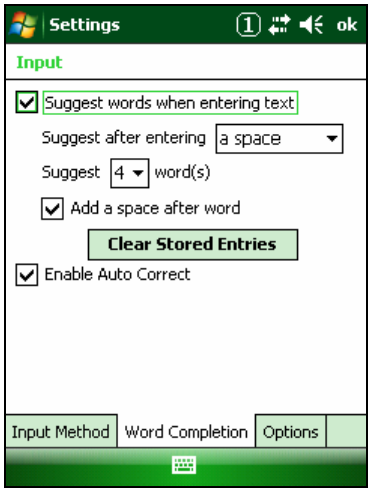


Figure 3.5

To enable the word completion feature, select **Suggest words when entering text** checkbox and set other relevant options.

Options Tab

This tab is to adjust preferences for writing and recording.

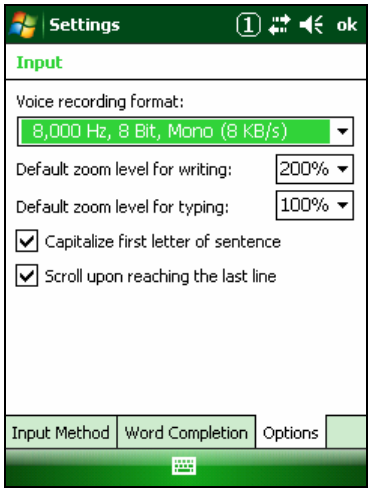


Figure 3.6

3.3 Lock

This applet is to set up a password that is used to start up the terminal.

Password Tab

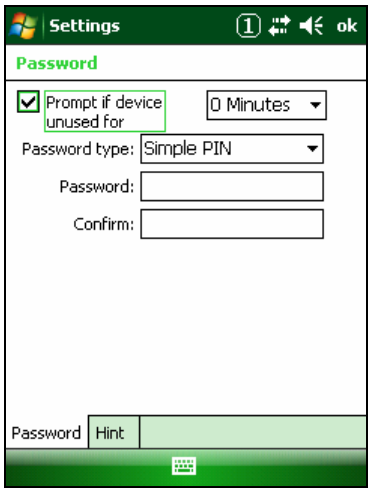


Figure 3.7

Prompt if device unused for

Check the checkbox if password input is required every time the terminal is turned off and then turned on during the time period selected in the pull-down menu. For example, selecting “0” in the pull-down menu makes the password enter screen pop up every time when the terminal is turned on asking the user to enter a password before starting any operation. Or, removing the check causes the password enter screen not to pop up irrespective of time period selected in the pull-down menu.

Password type

Select one of the password types in the pull-down menu you would like to use.

- **Simple PIN** indicates a numeric password.
- **Strong alphanumeric** indicates a password that uses uppercase and lowercase letters, numbers, and symbols such as punctuation.

Password

This field is for entering your password.

Confirm

This field is for entering the same password again entered in the **Password** field for confirmation purpose.

Hint Tab

This tab is for setting up a password hint.

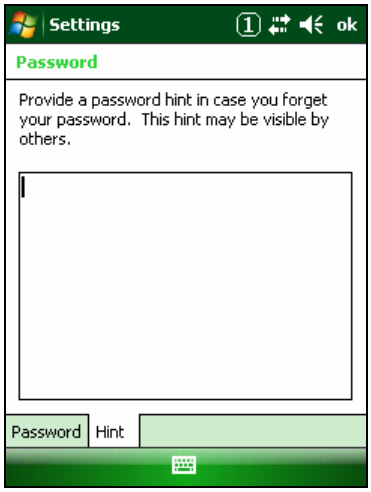


Figure 3.8

To help you recall your own password, enter a word or phrase that reminds you of the password.

3.4 Menus

This applet is used for changing the content of the Start menu. You can select up to seven programs.

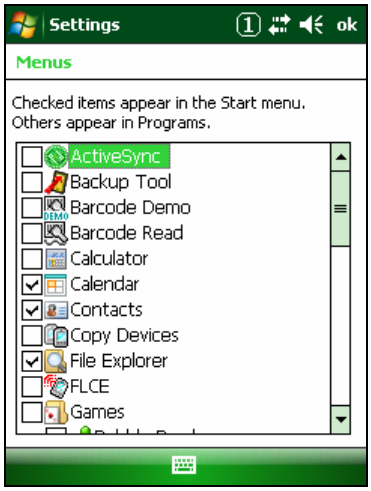


Figure 3.9

3.5 Owner Information

This applet is for setting information related to the owner.

Identification Tab

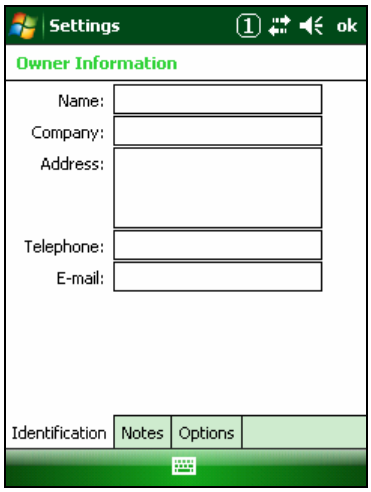


Figure 3.10

Name

This field is for specifying the owner's name inputting alphabets from the Input Panel appeared at the lower part on the screen.

Company

This field is for specifying name of the company that the owner belongs to.

Address

This field is for specifying an address.

Telephone

This field is for specifying a phone number.

E-mail

This field is for specifying an e-mail address.

Notes Tab

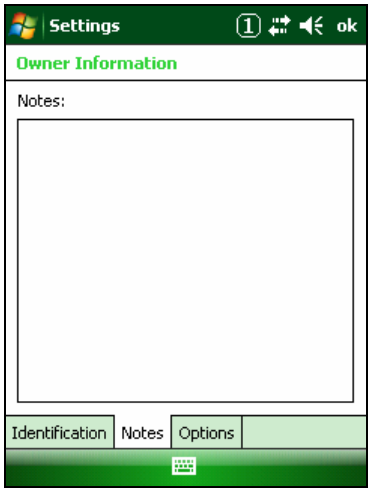


Figure 3.11

Notes

Using this field, a memo can be freely written.

Options Tab

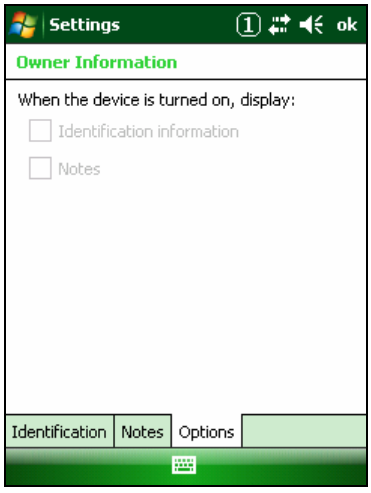


Figure 3.12

To display identification information or note when starting up the terminal, select either the **Identification information** checkbox or the **Notes** checkbox.

3.6 Sounds & Notifications

This applet is to set up event sounds and notification options.

Sounds Tab

This tab is to set up “Enable” or “Disable” for sound types of each event listed in the figure below.

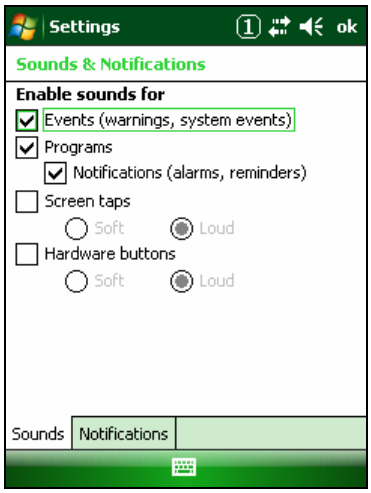


Figure 3.13

Check the checkbox of each event you wish to set up sound.

Notification Tab

Figure 3.14

In the **Event** pull-down menu, tap an event name and then set up the relevant options for how you want to be notified. The options include special sound, message, and flashing light. Even if you disable all the options, you can still be notified by the icon of event.

3.7 Today

This applet is used for customizing the Today screen.

Appearance Tab

This tab is used for changing the appearance of the Today screen.

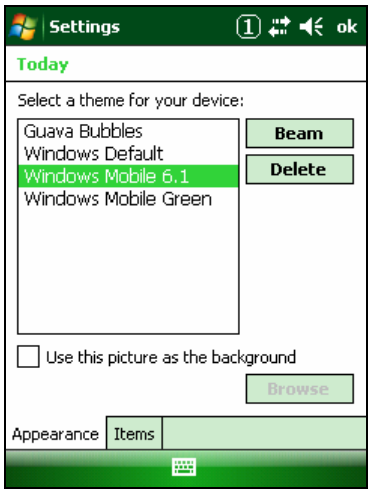


Figure 3.15

To change the current theme, highlight a new theme in the **Select a theme for your device** menu.

To change the background image in the Today screen, follow the steps below.

1. Select the **Use this picture as the background** checkbox and tap **Browse** button to make a list of your picture files appear.
2. In **Folder**, select the folder that contains the picture you want to use.
3. In **Type**, select the file type of the picture.
4. Tap the file name of the picture you want to use.

Items Tab

This tab is used for changing the items that appear in the Today screen.

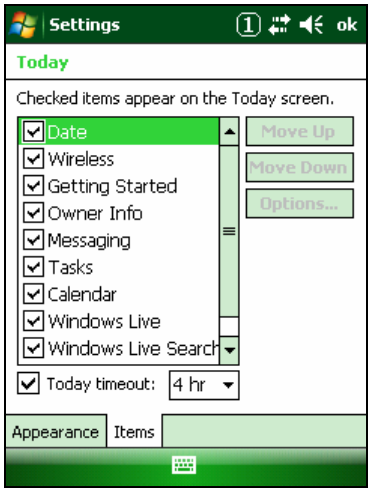


Figure 3.16

To add or remove items in the Today screen, check the checkbox next to each item name to add, or remove the check to remove. To change the listed order of an item displayed in the Today screen, select the item and tap **Move Up** button for upper position or **Move Down** button for lower position.

3.8 About

This applet is used for displaying and setting parameters concerned with the internal system of the terminal.

Version Tab

This tab displays OS version, integrated CPU name and available RAM size.

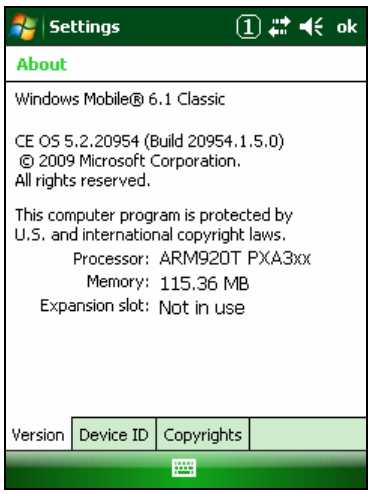


Figure 3.17

Device ID Tab

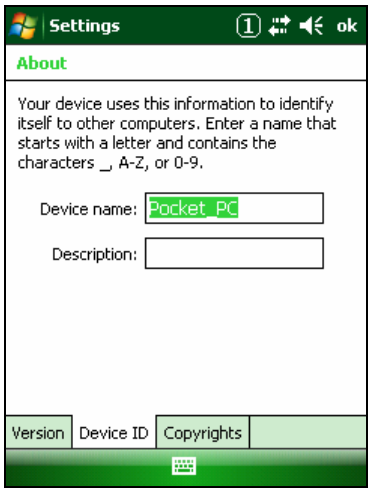


Figure 3.18

Device name

This field is for setting device name for the terminal itself. Spaces with device name entered in the field are not allowed.

Description

This field is to enter text string for the device description.

Copyrights Tab

This tab is for displaying the OS copyright information.

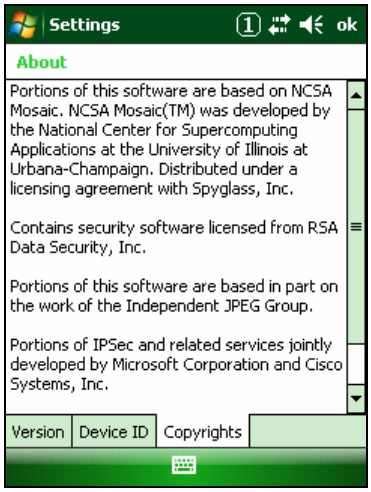

Settings
ok
About
Portions of this software are based on NCSA Mosaic. NCSA Mosaic(TM) was developed by the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign. Distributed under a licensing agreement with Spyglass, Inc.
Contains security software licensed from RSA Data Security, Inc.
Portions of this software are based in part on the work of the Independent JPEG Group.
Portions of IPSec and related services jointly developed by Microsoft Corporation and Cisco Systems, Inc.
Version
Device ID
Copyrights

Figure 3.19

3.9 Backlight

This applet is for setting brightness for the power source provided by either installed battery or external power source from the dedicated AC Adaptor via cradle, the backlight auto dimming, and the backlight auto off.

Note:
Do not remove the check from **Turn off backlight when a button is pressed or the screen is tapped** checkbox in both Battery Power Tab (see Figure 3.20) and External Power Tab (see Figure 3.21). The backlight does not turn on when turning on the power with Power key or the backlight auto off function does not perform correctly if the check is removed.

Battery Power Tab

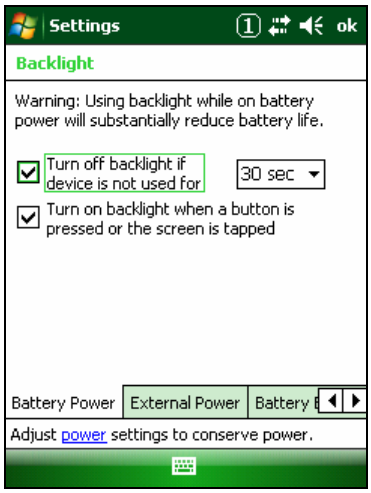

Settings
ok
Backlight
Warning: Using backlight while on battery power will substantially reduce battery life.
Turn off backlight if device is not used for
30 sec
Turn on backlight when a button is pressed or the screen is tapped
Battery Power
External Power
Battery
Adjust power settings to conserve power.

Figure 3.20

To set the backlight auto off, select **Turn off backlight if device is not used for** checkbox, and a period of elapse time in the pull-down menu.

External Power Tab

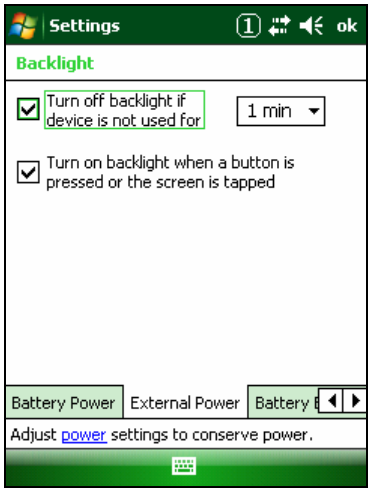


Figure 3.21

To set the backlight auto off, select **Turn off backlight if device is not used for** checkbox, and a period of elapse time in the pull-down menu.

Battery Brightness Tab

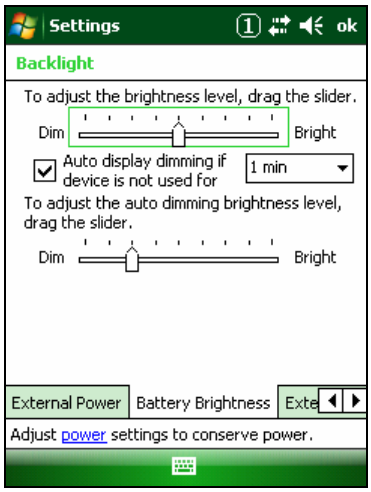


Figure 3.22

Brightness level

The upper slider is for specifying brightness in one of nine grades which becomes effect while battery pack is being used as the power source.

Auto dimming brightness

The lower slider is for specifying brightness in one of eight grades which becomes effect when the auto brightness dimming mode starts up. This auto brightness dimming mode is operable only during battery pack is used as the power source.

External Brightness Tab

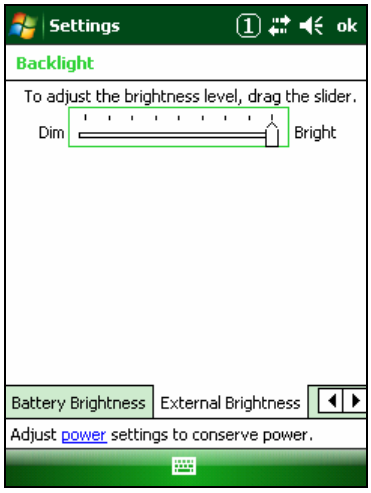


Figure 3.23

Brightness level

The slider is for specifying brightness in one of nine grades which becomes effect while an external power supply - by the dedicated AC Adaptor via cradle - is used as the power source.

3.10 Buzzer

This applet is to set up “Enable” or “Disable” for buzzer sound and its sound volume in one of the three grades (minimum, medium, and maximum) for each event. Setting on the sound volume can be checked by clicking the respective triangle buttons on the right side.

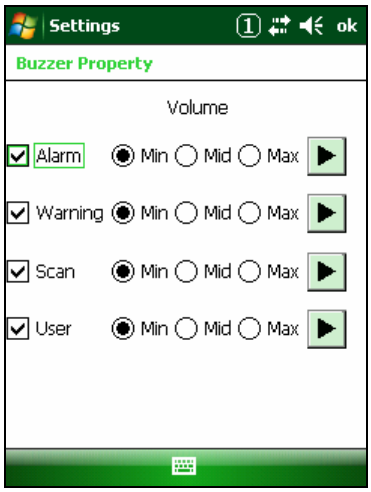


Figure 3.24

3.11 Certificates

This applet is used for editing certificates trusted by the user.

Personal Tab

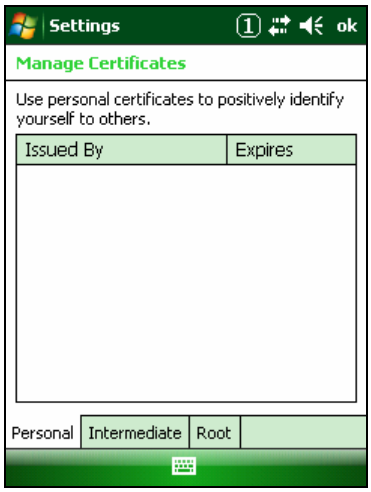


Figure 3.25

Personal certificates identify the user of the terminal.

Intermediate Tab

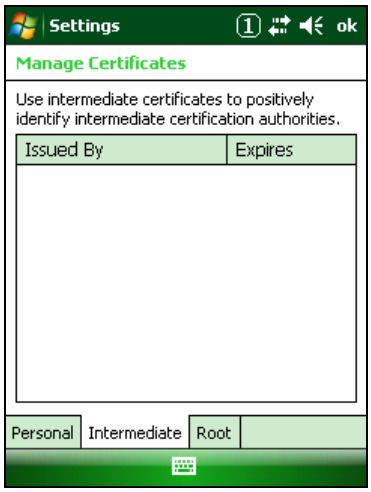


Figure 3.26

Intermediate certificates help authenticate certificates received from other hosts.

Root Tab

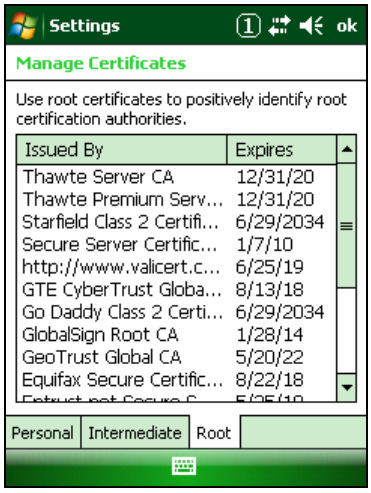


Figure 3.27

Root certificates authenticate certificates received from other hosts.

3.12 Clock & Alarms

This applet is for setting date, time and time zone.

Time Tab

This tab is for setting time zone, time and date.

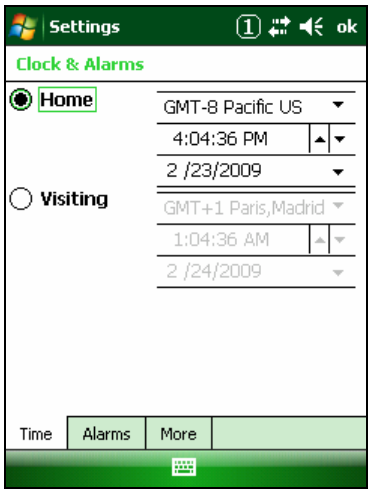


Figure 3.28

Alarms Tab

This tab is for setting alarms.

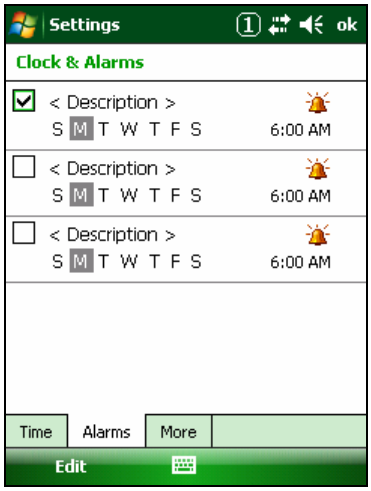


Figure 3.29

To set alarms, follow the steps below.

1. Tap **< Description >** and enter a name for the alarm.
2. Tap the day of the week for the alarm. You can select multiple days by tapping each desired day of the week.
3. Tap the time to open a clock and set the time for the alarm.
4. Tap to specify the type of alarm you want.

More Tab

This tab is for setting options.

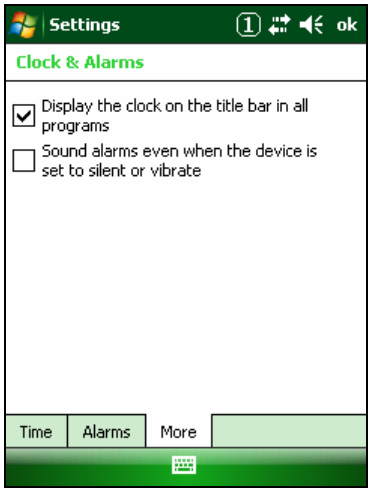


Figure 3.30

To display the clock in the title bar, select **Display the clock on the title bar in all programs** checkbox.

3.13 CPU Speed

This applet is for setting the CPU operating speed.

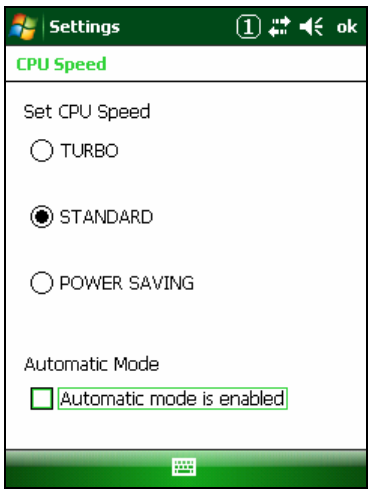


Figure 3.31

TURBO

This mode sets the CPU frequency to 624 MHz. The mode is disabled when the Automatic Mode is set effect.

STANDARD

This mode sets the CPU frequency to 312 MHz. The mode is disabled when the Automatic Mode is set effect.

POWER SAVING

This mode sets the CPU frequency to 208 MHz. The mode is disabled when the Automatic Mode is set effect.

Automatic Mode

This mode automatically switches the CPU frequency to either **TURBO**, **STANDARD**, or **POWER SAVING** mode according to the load on the CPU. Check the checkbox to set the mode.

3.14 Customer Feedback

This applet is for enabling Customer Feedback.

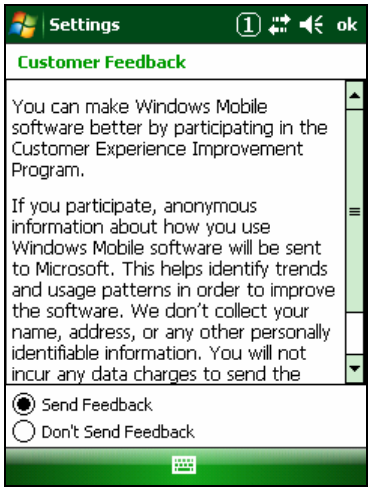

Settings
ok
Customer Feedback
You can make Windows Mobile software better by participating in the Customer Experience Improvement Program.
If you participate, anonymous information about how you use Windows Mobile software will be sent to Microsoft. This helps identify trends and usage patterns in order to improve the software. We don't collect your name, address, or any other personally identifiable information. You will not incur any data charges to send the
Send Feedback
Don't Send Feedback

Figure 3.32

While Customer Feedback is enabled, general usage information is collected and sent to Microsoft. No personally identifiable information is collected, and there are no airtime charges to you.

3.15 Encryption

This applet is for enabling to encrypt files placed on storage cards.

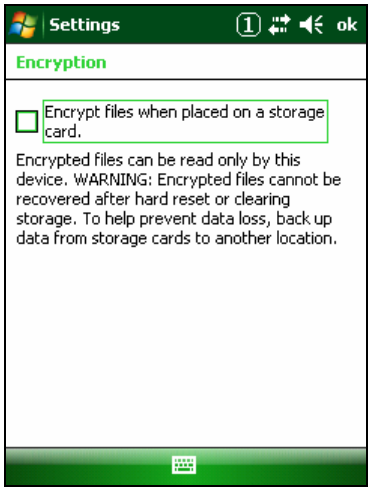

Settings
ok
Encryption
Encrypt files when placed on a storage card.
Encrypted files can be read only by this device. WARNING: Encrypted files cannot be recovered after hard reset or clearing storage. To help prevent data loss, back up data from storage cards to another location.

Figure 3.33

Encrypt files when placed on a storage card

Encrypted files are opened just like other files, provided you are using the terminal that encrypted them. There is no separate step for you to take to read these files.

3.16 Error Reporting

This applet is for enabling Error Reporting.

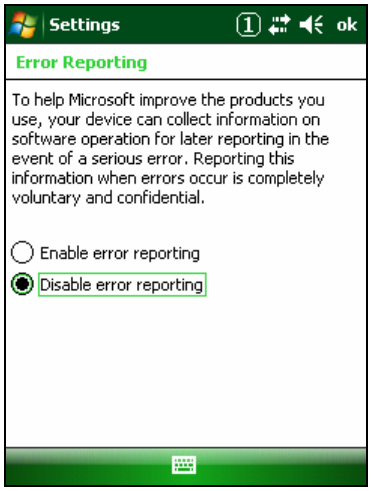

Settings
ok
Error Reporting
To help Microsoft improve the products you use, your device can collect information on software operation for later reporting in the event of a serious error. Reporting this information when errors occur is completely voluntary and confidential.
Enable error reporting
Disable error reporting

Figure 3.34

While Error Reporting is set enabled, serious error information is collected and sent to Microsoft.

3.17 External GPS

This applet is used to configure the built-in GPS receiver.

Programs Tab

This tab is for selecting the port from which programs will access GPS data. The program port must be a different port than the one specified as the hardware port.

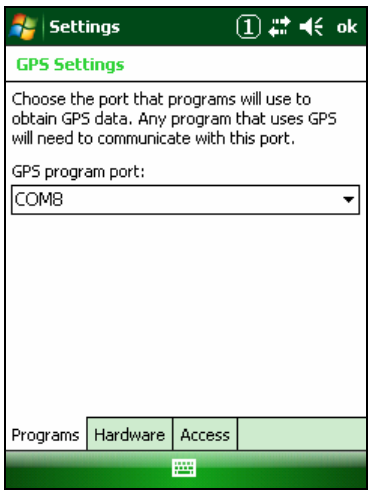


Figure 3.35

Hardware Tab

This tab is for selecting the port to which your GPS receiver is connected. The hardware port must be a different port than the one specified as the program port.

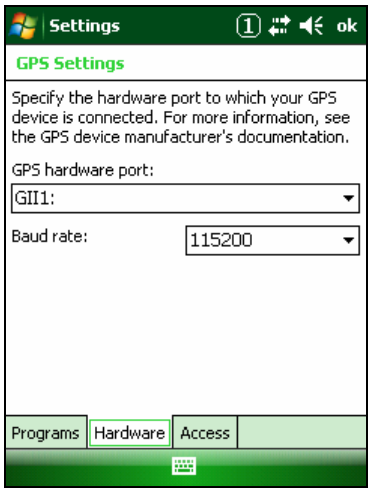


Figure 3.36

Access Tab

This tab is for enabling multiple programs to access GPS data simultaneously, the terminal automatically manages access to your GPS receiver. It is highly recommended that this option always be selected. Otherwise, only one program at a time can access your GPS receiver.

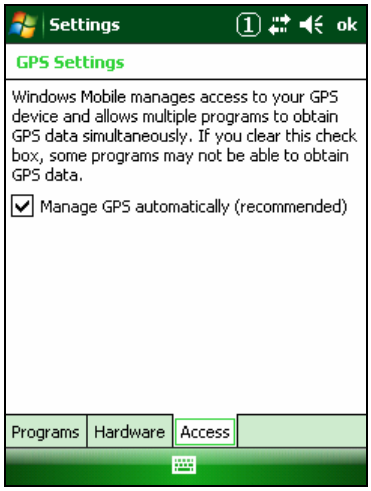

Settings
ok
GPS Settings
Windows Mobile manages access to your GPS device and allows multiple programs to obtain GPS data simultaneously. If you clear this check box, some programs may not be able to obtain GPS data.
Manage GPS automatically (recommended)
Programs
Hardware
Access

Figure 3.37

3.18 Imager Setting

This tool allows the user to change the parameters and operating modes required for reading 1D and 2D bar code symbologies with the integrated C-MOS imager (model dependant). The changed parameters and modes are saved in ini file and become effect automatically when the **TDRead** application invokes.

1D and 2D Tabs

These tabs are to set up the 1D bar code symbologies in the 1D tab and 2D bar code symbologies in the 2D tab respectively. The checkboxes with check marks enable the bar code symbologies to be read. Or, removing the check mark disables the bar code symbology not to be read.

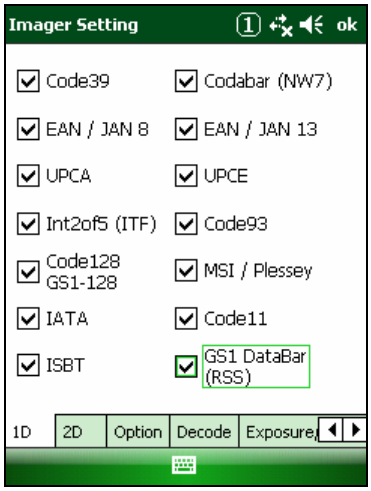


Figure 3.38

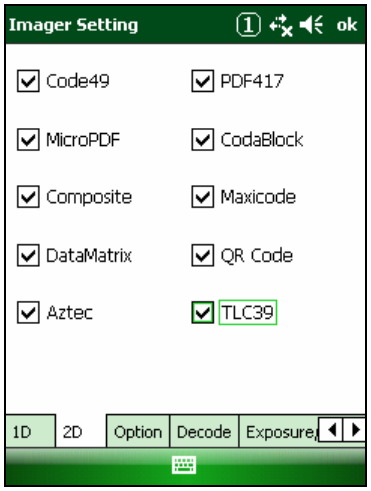


Figure 3.39

Option Tab

This tab is to set up relevant options for scanning a symbol of the specified bar code symbology.

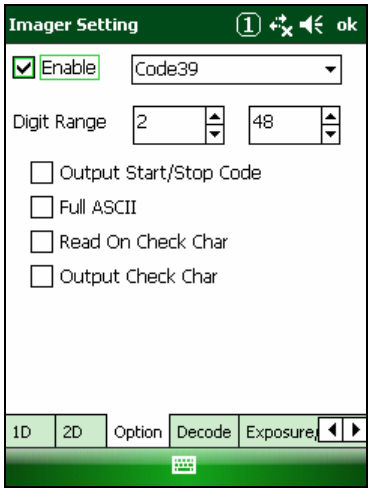


Figure 3.40

Enable

With a check mark in the checkbox, it is possible to scan the bar code symbology selected in the pull-down menu.

Digit Range

This field is to set up the effective range of reading symbol of the selected bar code symbology, the pull-down menu on the left side is for the minimum number of digits and the other on the right side is for the maximum number of digits. A symbol of the selected bar code symbology meeting these four options can only be scanned and decoded.

Decode Tab

This tab is to set up options for decoding scanned bar code data.

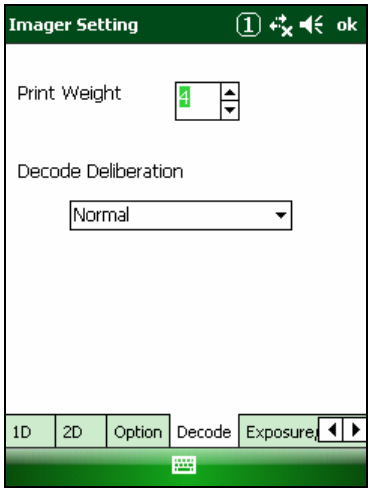


Figure 3.41

Print Weight

This field is to set the intensity in the range of 1 to 7 for target printed symbol. Setting a value higher improves reading a symbol printed in dark color, or lower improves reading a symbol printed in pale color.

Decode Deliberation

This field is to specify decode deliberation mode by selecting one in the modes listed below. If it is set to “Very Quick” or “Quick”, the decoding speed becomes fast though the number of symbols to be decoded is limited instead. Or, if it is set to “Deliberate” or “Very Deliberate”, the speed becomes slow though the number of symbols to be decoded is increased.

- Very Quick
- Quick
- Normal
- Deliberate
- Very Deliberate

Exposure/LED Tab

This tab is to specify the intensity for both LEDs, Aimer and Illumination.

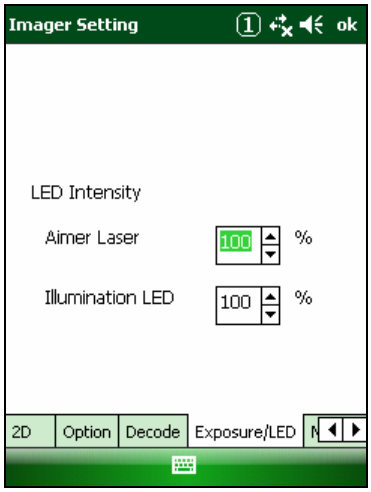


Figure 3.42

Aimer Laser

This field is to set the intensity of the Aimer to either “0” for turning off or “100” for turning on.

Illumination LED

This field is to set the intensity of the Illumination to either “0” for turning off or “100” for turning on.

Multi Step Tab

This tab is to specify a reading mode by selecting one of the radio buttons in the figure.

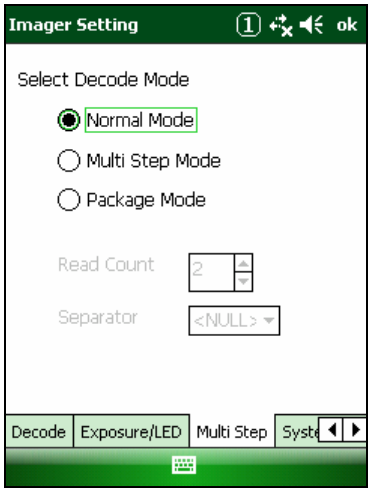


Figure 3.43

Normal Mode

This radio button selects the normal read mode.

Multi Step Mode

This radio button selects the multi-step read mode which continuously reads multiple symbols until when the Trigger key is released.

Package Mode

This radio button selects the package read mode which continuously reads multiple symbols until when the Trigger key is released and then outputs a result of reading all the symbols.

Read Count

This field is to set the number of symbols to read in the Multi-step and Package modes.

Separator

This field is to set a character as the delimiter inserted in between decoded data of scanned bar codes in the Package mode.

System Tab

This tab is to set a period of time for the APO (Automatic Power OFF) function to activate and "Enable" or "Disable" for turning on the power on the terminal with the Trigger key.

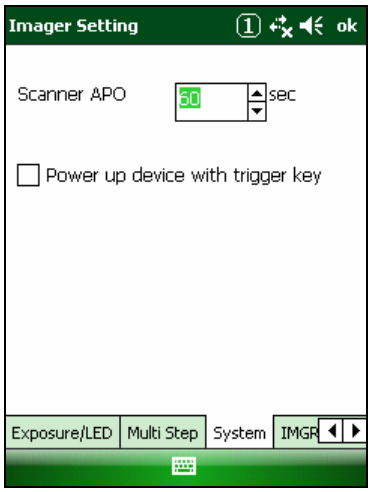


Figure 3.44

Scanner APO

This filed is to set a period of time in the range of 0 to 1800 (in second) for the APO function to activate. Setting "0" will disable the function.

Power up device with trigger key

This checkbox is to set "Turning on the power of the terminal with the Trigger key" effect. With a check mark in the checkbox, the power on the terminal can be turned on when one of the Trigger keys is pressed down.

IMGRead Tab

This tab is for setting the parameters for “Image Scanner Read”.

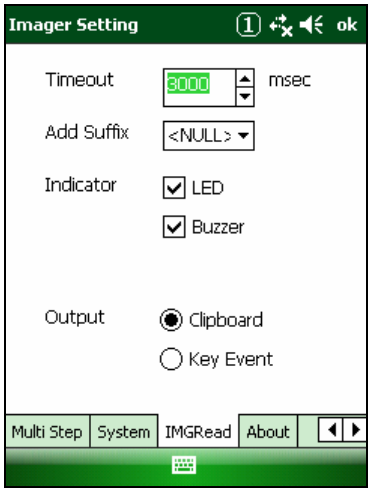


Figure 3.45

Timeout

This field is to set a time period for the Timeout to activate in scanning operation. Scanning terminates either when the Trigger key is released or when the time period in milliseconds set in this field elapses.

Add Suffix

This field is to specify a suffix that is appended at the end of each decoded data.

Indicator

These two checkboxes are to set scanning completion notification method with either LED or sound or both. Notification method with a check mark in the checkbox will activate when scanning a symbol is complete.

Output

These two radio buttons are to specify an output method for decoded bar code data selecting either one of the buttons.

About Tab

This tab displays current version information of the imager setting tool.

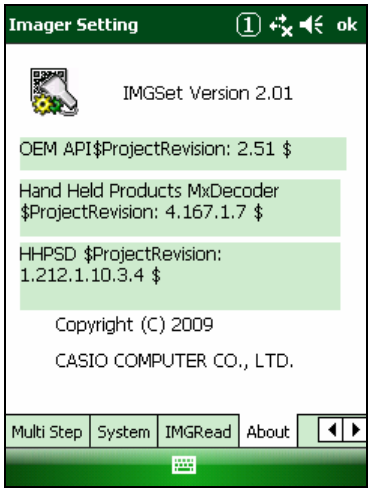


Figure 3.46

3.19 Managed Programs

This applet is used for displaying the information about programs installed by your system administrator.

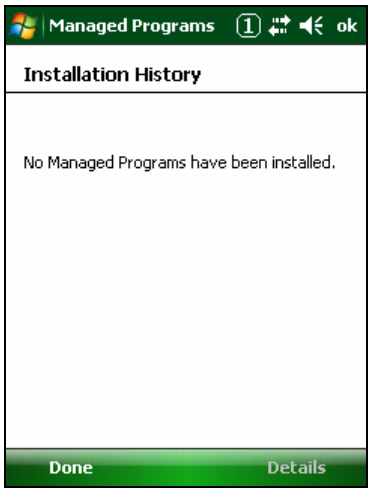


Figure 3.47

3.20 Memory

This applet is used to view the usage of main memory and storage card memory.

Main Tab

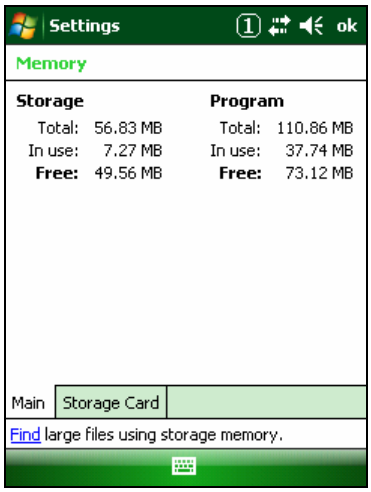


Figure 3.48

The amount of memory allocated to file and data storage versus program storage is displayed, as well as the amount of memory in use versus the available memory.

Storage Card Tab

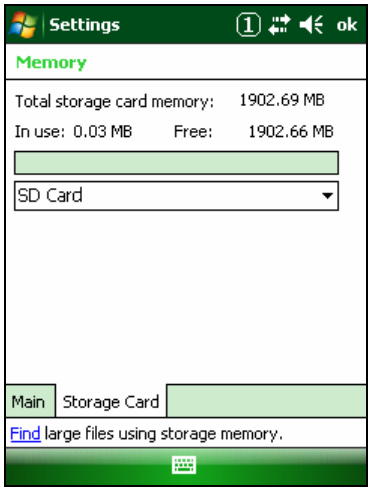


Figure 3.49

You can see how much memory is available on a storage card that is inserted into your terminal.

3.21 Power

This applet is used to view the status of batteries and set power management options.

Battery Tab

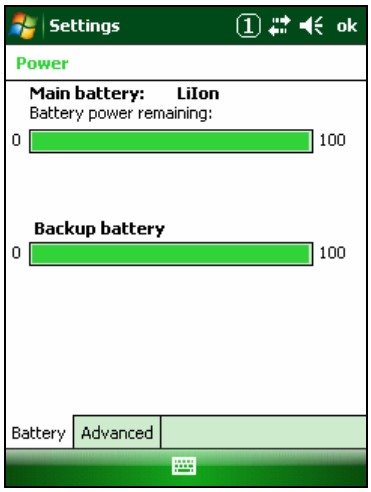


Figure 3.50

This tab provides information about status of main battery (lithium-ion battery pack) and backup battery.

Advanced Tab

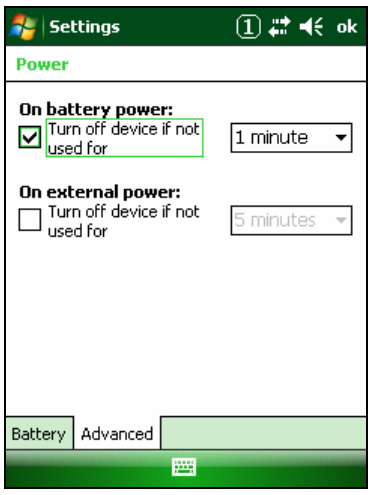


Figure 3.51

To conserve battery power, select the checkbox for condition that you want the terminal to turn off its power automatically if no access to the terminal is made during the selected time period in the pull-down menu located on the right side of the checkbox.

3.22 Regional Settings

This applet is for setting display method and format of your regional items such as numeric value, currency, date, and time.

Region Tab

This tab is for selecting your language and regional items. The items you select determine which options are selected by default on the other tabs.

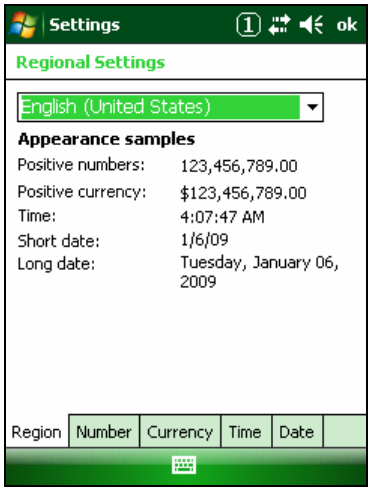


Figure 3.52

Number Tab

This tab is for setting display format of numeric value.

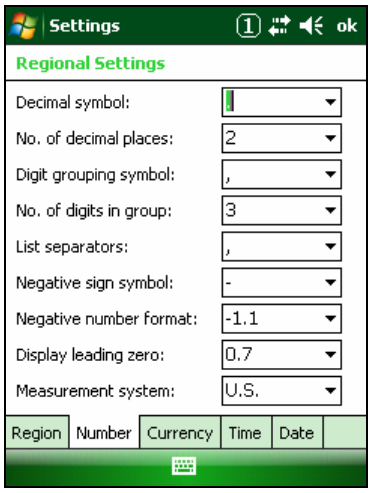


Figure 3.53

Currency Tab

This tab is for setting display format of currency.

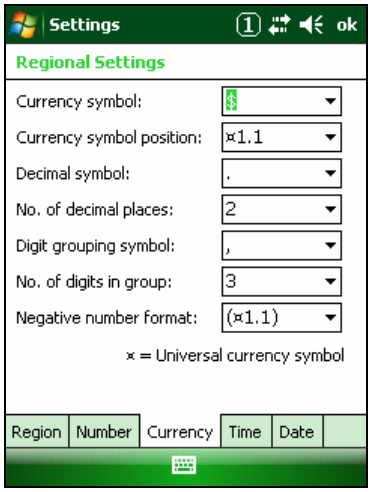


Figure 3.54

Time Tab

This tab is for setting display format of time.

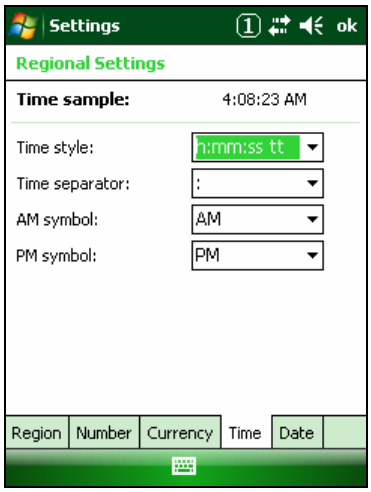


Figure 3.55

Date Tab

This tab is for setting display format of date.

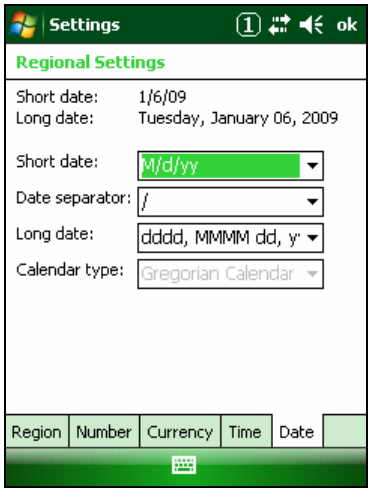


Figure 3.56

3.23 Remove Programs

This applet is used to display all programs installed in the terminal and delete them. To remove a program, highlight the program in the field (see Figure 3.57) you want to remove, and tap **Remove** button.

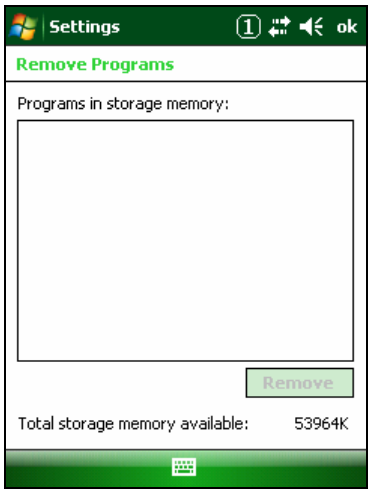


Figure 3.57

Note:
Programs burnt in the ROM in the terminal cannot be deleted.

3.24 Scanner Setting

This applet is to change the settings for the integrated Laser Scanner (model dependant). For detail about each parameter, refer to Chapter 2.2 “Laser Scanner”.

Read barcode Tab

This tab is for specifying bar code symbologies to scan. Multiple bar code symbologies can be specified.

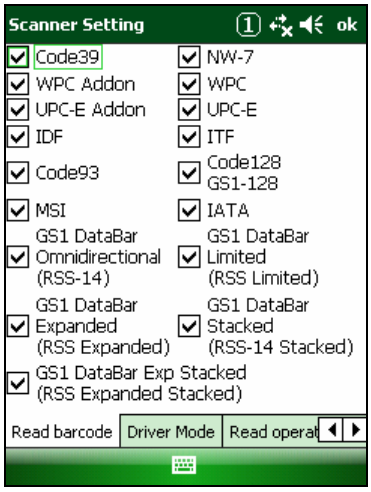


Figure 3.58

Driver Mode Tab

This tab is to set “Enable” or “Disable” for scanning each bar code symbology of the symbologies listed in **Read barcode** tab and its parameters listed below.

- Min (No. of minimum readable digits)
- Max (No. of maximum readable digits)
- Output format
- Check-digit
- Check-digit output

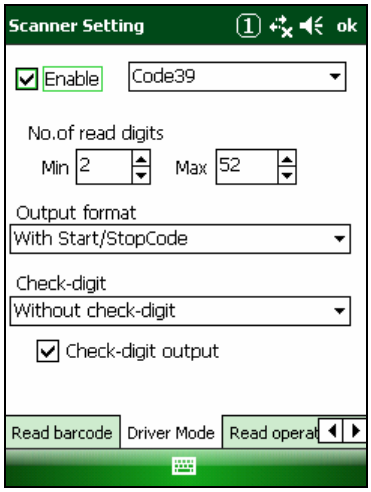


Figure 3.59

Read operation and **Read operation 2 Tabs**

These tabs are to set the following parameters related to scanning bar code symbologies. Choose a mode you wish to set in each pull-down menu.

Options of read mode in Read operation Tab (see Figure 3.60)

- Selection of the read method, “Continuous read” or “Single read”.
- Selection of beam width for the scan width control function, “Wide”, “Middle” and “Narrow”.
- Selection of the scan verification beam function, “Disable” or “Enable”.
- Selection of the decoded data output destination, “OBR buffer”, “Clipboard”, or “Keyboard”.
- Selection of termination code, “Disable termination code”, “CR”, “LF”, “CR”, “LF”, or “TAB”.
- Selection of the decoding level, “Normal” or “High”.
- Selection of the read mode, “Normal read” or “Gradation read (= Multi step read)”.
- Selection of the filter function, “With or without filter” or “With soft filter”. Note that other filter modes in the pull-down menu are not operable with the terminal.

Options of mode in Read operation 2 Tab (see Figure 3.61)

- Selection of the gain, Gain Mode0 to Mode3.
- Selection of the learning decode function, “Learning Decode ON” or “Learning Decode OFF”.

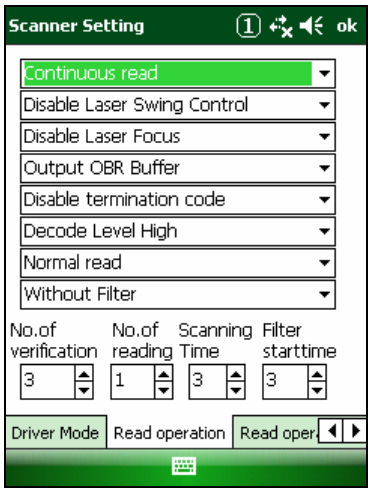


Figure 3.60

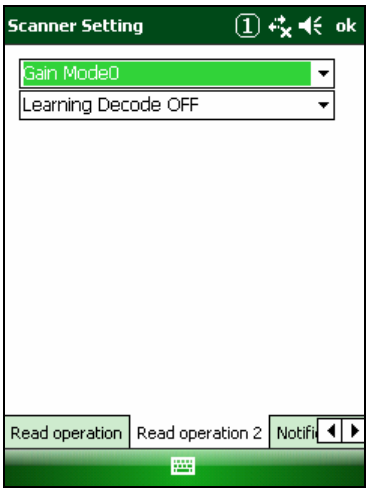


Figure 3.61

Notification Tab

This tab is to set up notification method selecting one of the methods listed below. The notification is issued when scanning a bar code is complete.

- Lights up the LED.
- Sounds the buzzer.

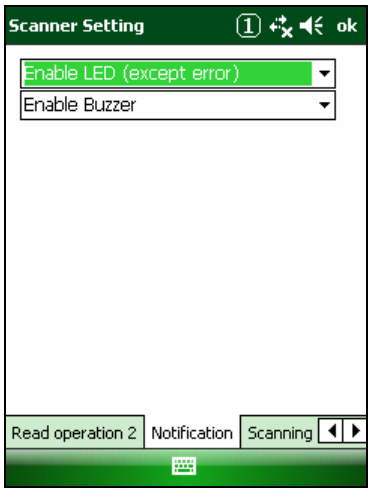


Figure 3.62

Scanning Key Tab

This tab is to set up “Enable” or “Disable” for each key of the keys listed below as the scan trigger key.

- Left Trigger (L Trigger key)
- Right Trigger (R Trigger key)
- [L] Key (Cursor Left key)
- [R] Key (Cursor Right key)
- [U] Key (Cursor Up key)
- [D] Key (Cursor Down key)
- Center Trigger (Center Trigger key)

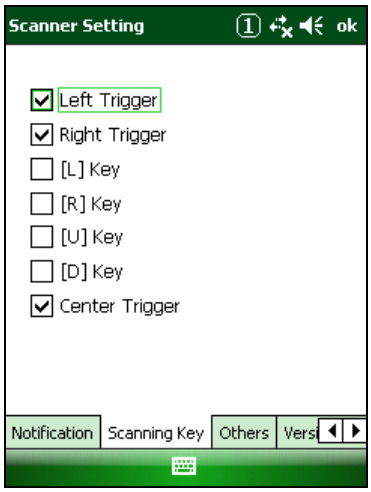


Figure 3.63

Note:
Since the trigger grip cannot be integrated to the terminal, setting of the scan trigger key with the trigger grip does not make any effect to initiate scanning operation.

Others Tab

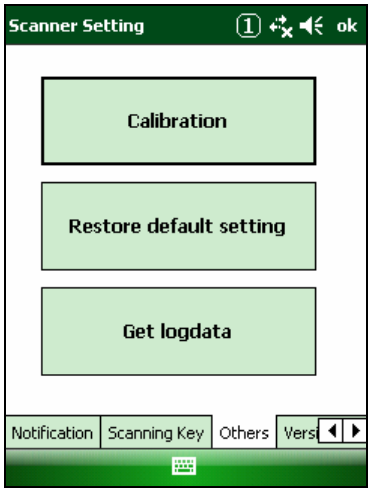


Figure 3.64

Calibration Button

This button displays the OBR calibration screen to set up the calibration of laser beam swing angle. Follow the guidance appeared on the screen to complete the calibration.
The swing angle has been set at the factory prior to shipment. Only if it is almost certain that the swing angle is not right, adjust it in this mode.

Restore default setting Button

This button resets setting contents and restores all the settings to the defaults.

Get logdata Button

This button captures log information for both scanner and decoder units. The following are the log file names.

- Scanner unit: "\ObrLog.dat"
- Decoder unit: "\DecodeLog.dat"

Version Tab

This tab displays version information for the Laser Scanner setting tool.

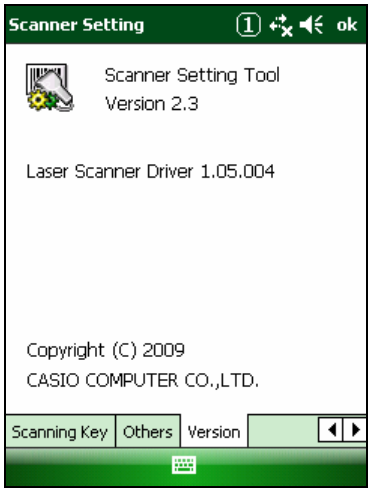


Figure 3.65

3.25 Screen

This applet is for changing the screen orientation, aligning the screen, and adjusting the text size.

General Tab

This tab is for changing the screen orientation and aligning the screen.

To change the screen orientation, tap one of the **Orientation** radio buttons.
To realign the touch screen, tap **Align Screen** button and follow the instruction appeared.

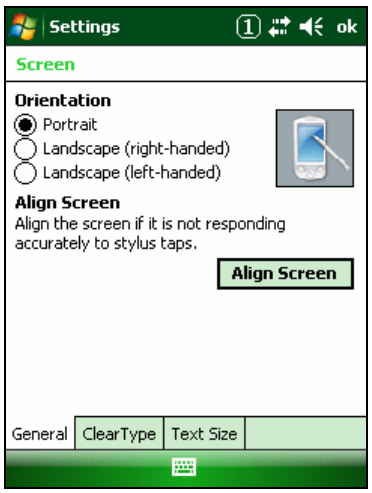


Figure 3.66

Clear Type Tab

This tab is for enabling a font-smoothing technology.

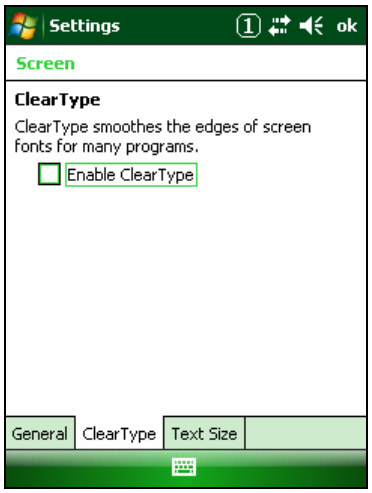


Figure 3.67

Text Size Tab

This tab is to adjust the text size.

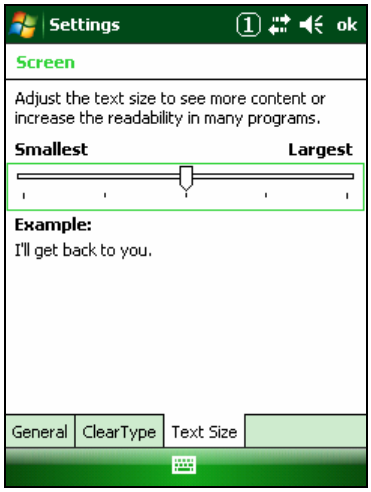


Figure 3.68

To adjust the text size, move the slider right or left to increase or decrease the text size.

3.26 Task Manager

This applet is used to view running tasks, switch tasks, and stop tasks.

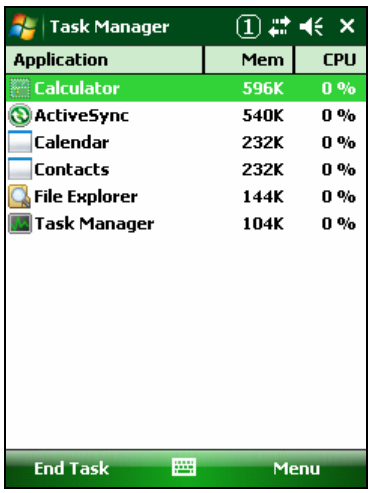


Figure 3.69

1. To switch to selected program, tap the program that you want to use and navigate to **Menu** → **Switch To**.
2. To stop running program, tap the program that you want to stop and tap **End Task**.
3. To stop all running programs, navigate to **Menu** → **End All Tasks**.

Table 3.4 Menu in the applet

Menu			Description
End Task			Ends the selected program.
Menu			
	Switch To		Switches to the selected program.
	End All Tasks		Ends all running programs.
	View		
		Applications	Displays all running programs.
		Processes	Displays all running processes.
	Sort By		
		Memory	Displays program list sorted by memory size.
		CPU	Displays program list sorted by CPU usage.
		Name	Displays program list sorted by name.
	Refresh		Updates to the latest information.
	Exit		Exits the Task Manager.

3.27 USB Connection

This applet displays connection establishment with PC or other device in USB mode. It is also used to change the connection related parameter settings.

Status Tab

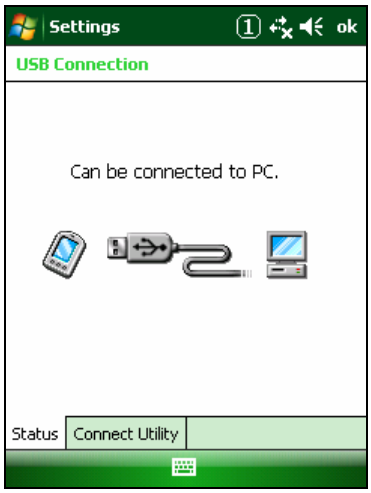


Figure 3.70

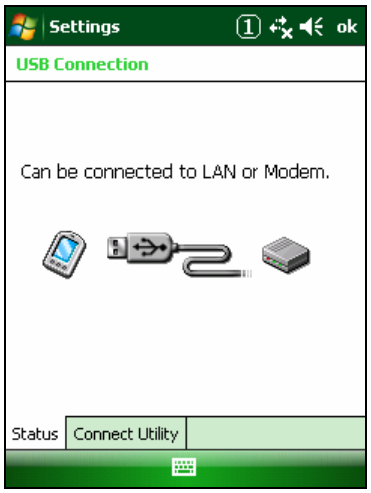


Figure 3.71

Can be connected to PC message appears in the tab (see Figure 3.70) when the terminal is connected to PC in USB Client mode (USB Function mode). Or, **Can be connected to LAN or Modem** message (see Figure 3.71) appears when the terminal is connected to LAN or modem in USB Host mode.

Connect Utility Tab

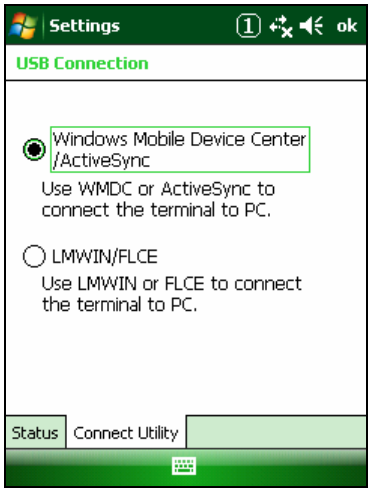


Figure 3.72

Windows Mobile Device Center/ActiveSync

Set this radio button effect to establish connection in Windows Mobile Device Center (or ActiveSync) between the terminal and PC via the USB connection. The radio button has been set effect by default.

LMWIN/FLCE

Set this radio button effect to establish connection in LMWIN (or FLCE) between the terminal and PC via the USB connection.

3.28 Version Info

This applet is used to display each version number of the OS, boot section, loader, and service pack integrated in the terminal.

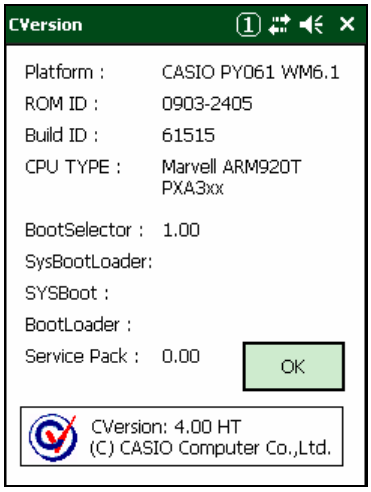


Figure 3.73

3.29 Windows Update

This applet is used to keep the integrated operating system up to date.

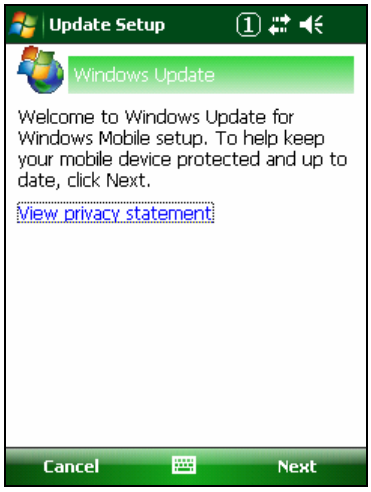

Update Setup
Windows Update
Welcome to Windows Update for Windows Mobile setup. To help keep your mobile device protected and up to date, click Next.
View privacy statement
Cancel
Next

Figure 3.74

3.30 Beam

This applet is for enabling to receive all incoming IrDA and Bluetooth beams.

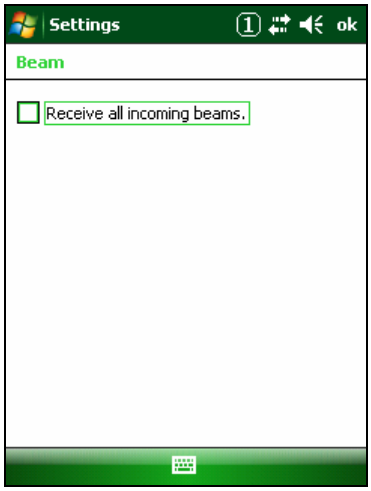


Figure 3.75

To enable you to receive all incoming beams, check the **Receive all incoming beams** checkbox.

Note:
To conserve battery power, make the **Receive all incoming beams** effect only for a period you are receiving beamed files.

3.31 Bluetooth

3.31.1 Devices

This applet carries out connection establishment with other Bluetooth device.

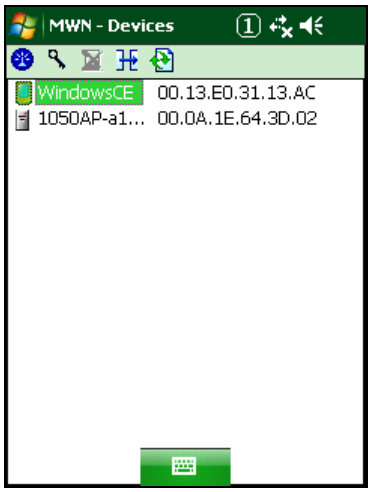


Figure 3.76 Devices screen

Below is a list of the devices displayed in the screen if existed.

Table 3.5 Device Icons

Icon	Device Type
	PDA
	Laptop computer
	Desktop computer
	Bluetooth mobile phone
	Bluetooth printer
	Bluetooth headset (voice)
	Bluetooth access point
	Dial-up network (DUN)
	Bluetooth device other than the above (a Bluetooth printer may be displayed with this icon)
	Connecting
	Bonded
	Bonded or connecting
	Connecting PDA
	Mobile phone or bonded
	Laptop computer or bonded or connecting
	Shared serial device

Notes:

- Clicking and holding a device appeared in the screen for a long period displays the context menu.
- Double clicking the device displays its service information.
- The DT-X30 does not support Bluetooth headset.

Toolbar in the screen

The meanings of each icon appeared in the toolbar in the **Devices** screen are as follows.

Table 3.6 Icons in the toolbar

Icon	Description
	Displays the main menu.
	Display the multi-menu. The content of this menu differs depending on which screen is displayed.
	When multiple screens are open, closes the current screen.
	When multiple screens are open, selects and then moves the selected screen.
	Searches Bluetooth devices, and updates the devices list.

Configuration of the menu

Table 3.7 Main menu

Menu	Description
My Device	Displays the setup screen for Bluetooth of the terminal.
Shortcuts	Displays a list of shortcuts that have been created.
Default devices	Displays a list of default devices that have been created.
Wakeup Enabled	Sets up “Enable” or “Disable” for Wakeup function.
Use Headset (Note)	When a Bluetooth headset is configured, switches voice sound channel between the headset or the integrated microphone and speaker on the terminal.
Setup Wizard	Displays the Setup Wizard.
Version	Displays a window showing the version information of Bluetooth.
Minimize	Changes the screen to the Bluetooth icon in the toolbar at lower portion in the screen.
Exit	Exits the applet.

Note:

The DT-X30 does not support Bluetooth headset.

Table 3.8 Multi-menu

Menu	Description
Add Device	Adds a device that cannot be found in searching.
Show Addresses	Shows or hides the addresses of device found.
Bonded	Performs or resets bonding with selected device.
Show always	Displays selected device always in the list.
Remove	Deletes selected device from the list.
Disconnect	Disconnects Bluetooth connection establishment with all Bluetooth devices.
Properties	Displays the properties of selected device.

Table 3.9 Context menu

Menu	Description
Bonded	Performs or resets bonding with selected device.
Show always	Displays selected device always in the list.
Remove	Deletes selected device from the list.
Disconnect	Disconnects Bluetooth connection establishment with all Bluetooth devices.
Properties	Displays the properties of selected device.

Searching Device

To search Bluetooth device in the vicinity, click the (Update) icon in the toolbar. If a Bluetooth device is sought, the content of the devices list is updated.

Device Properties

Choose **Properties** in either the multi-menu or context menu to display **Device Properties** screen below.

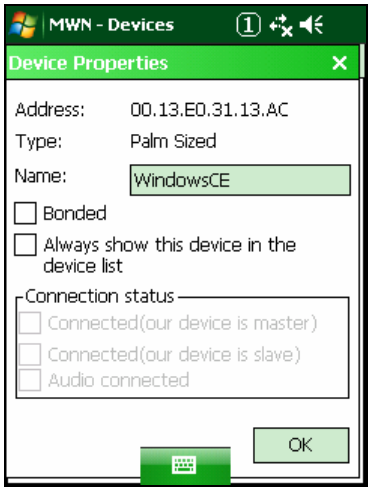


Figure 3.77

Address : Bluetooth address of the device sought.
Name : Name of the device sought.
Type : Type of the device sought.
Bonded : This checkbox is selected if bonding with the device sought.
Always show this device in the device list
: This checkbox is selected for the device sought to be displayed always in the list.
Connection status (see note)
: These checkboxes show connection status how this device is connected with other device.

Note:
These checkboxes are indicators only and the operator cannot change the settings.

PassKey Exchange

When bonding with Bluetooth device or retrieving services or establishing Bluetooth connection takes place, the terminal may display a window showing in the following figure requesting PassKey (PIN code). If the PassKey has been set, enter it in **Enter passkey** field, or a new PassKey if it has not been set beforehand. The same PassKey must be used by both the Bluetooth devices.

- Characters to be entered in **Enter passkey** field must be in ASCII characters up to 16.
- If PassKey is set beforehand a PassKey request can be eliminated.

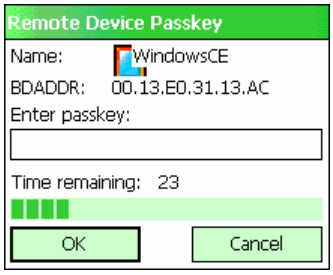


Figure 3.78 PassKey input window

3.31.2 Services

In **Devices** screen, double clicking a device appeared in the screen displays a list of the services available on the partner Bluetooth device as shown below.

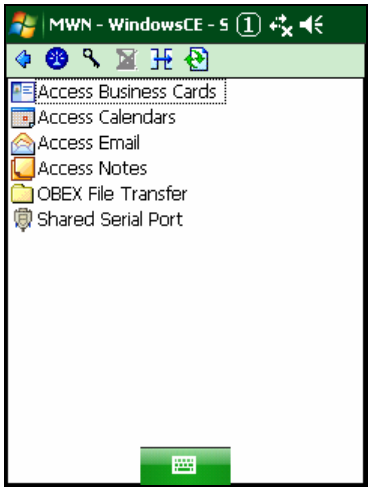


Figure 3.79 Services screen

Double clicking any one of services appeared in the screen establishes Bluetooth connection using the service. Note the following.

- Of services you choose, file transmission will be automatically carries out by the service.
- Retrieving a list of services and displaying window requesting a PassKey input may take place depending on the some Bluetooth devices.

Below is a list of the services displayed in the list.

Table 3.10 Service icons

Icon	Description
	Sends or receives business card files.
	Sends specified calendar file.
	Sends specified email file.
	Sends specified notes file.
	Establishes connection with specified device via Bluetooth FTP profile.
	Establishes connection with specified device via Bluetooth Serial Port profile.
	Establishes ActiveSync communication with specified Bluetooth device via Bluetooth Serial Port profile.
	Establishes connection with Bluetooth LAN Access-Point.
	Establishes connection with specified device via Bluetooth Dial-up Network profile.
	Establishes connection with specified device via Bluetooth PAN profile.
	Establishes connection with Bluetooth headset via Bluetooth headset service. (see note)

Note:
The DT-X30 does not support Bluetooth headset.

Configuration of the toolbar

The roles of each icon in the toolbar are as follows.

Table 3.11 Icons in the toolbar

Icon	Description
	Returns to the Devices screen.
	Displays the main menu.
	Displays the multi-menu. The content of the menu differs depending on screen displayed.
	When multiple screens are open concurrently, closes the current screen appeared and returns to the screen one path before.
	When multiple screens are open, selects and moves a screen.
	Retrieves service information again and updates the list of services.

When establishing a Bluetooth connection using a profile other than OBEX profile and FTP profile, the icons appeared in the toolbar in the screen are changed to the icons shown below.

Table 3.12 Icons in the toolbar

Icon	Description
	Displays the main menu.
	Displays the multi-menu. The content of the menu differs depending on screen appeared.
	Closes the current screen and returns to the services screen. If Bluetooth connection being established, it will be disconnected.
	When multiple screens are open, selects and moves a screen. Returns to the services screen while the Bluetooth connection is kept established.
	Closes the Bluetooth connection. Does not allow the services screen to return.
	Establishes Bluetooth connection again once after the Bluetooth connection has been disconnected.

Configuration of the main menu

The main menu has the same submenus available in the Devices screen. The menus for the context menu and multi-menu are shown below.

Table 3.13 Context menu/Multi-menu

Menu	Description
Add Shortcut	Creates a shortcut for specified service, and then adds it to the shortcuts list.
Use to connect for ActiveSync	Establishes connection in ActiveSync via specified serial port.
Set Default device	Sets up specified service into default device.

Connection via Serial Port Profile (SPP)

The Serial Port Profile enables establishing connection with a Bluetooth device that supports Serial Port Profile (SPP), for virtual serial communication.

Establishing connection via Serial Port Profile

Double click the (serial port) icon appeared in following screen to display the Bluetooth connection screen (see Figure 3.81) shown below, and establishes connection via Serial Port Profile.

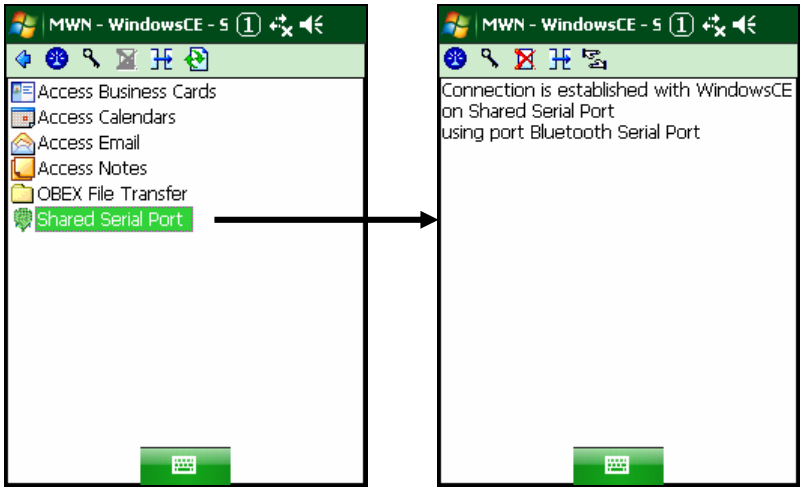


Figure 3.80 Figure 3.81

After the connection has been established, the communication application starts up, and communication is performed via virtual serial port.

Closing the communication

Click the icon in the toolbar in above figure (see Figure 3.81) to close the communication via Serial Port Profile. To close the Bluetooth connection screen, click the icon in the toolbar.

Establishing connection in ActiveSync via Serial Port Profile

Click and hold the Serial Port Profile icon to display the context menu (see Figure 3.82), and highlight **Use to connect for ActiveSync** in the menu. The icon changes to the icon (ActiveSync).

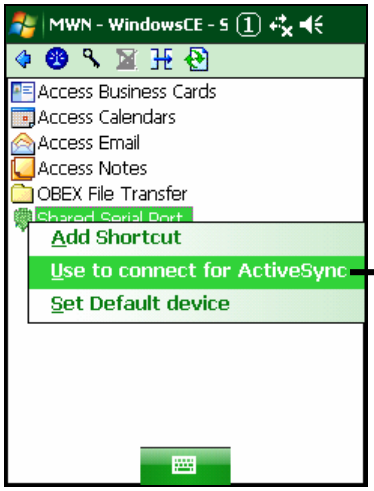


Figure 3.82

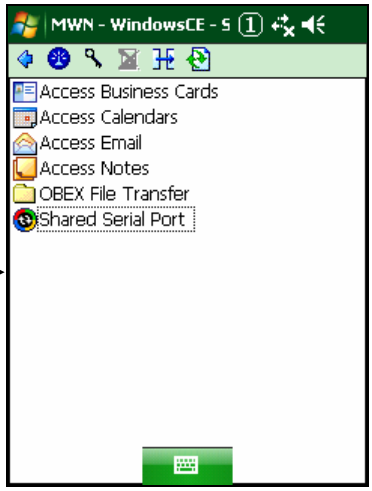


Figure 3.83

Double click the icon establishes connection via ActiveSync in Serial Port Profile. If Serial Port Profile is not used, click and hold the icon, and then highlight **Do not use for ActiveSync connection**.

Note:
When establishing connection in ActiveSync with PC, set a virtual COM port to the same COM port number in the ActiveSync setting that uses Bluetooth Serial Port Profile.

Closing the communication

Click the icon in the toolbar to close the communication. To close the Bluetooth connection screen, click the icon in the toolbar.

Connection via Dial-Up Network (DUN) Profile

This profile enables dial-up communication with a Bluetooth device via Dial-up Network (DUN). Double clicking the (dial-up) icon displays the screen shown in the following figure.

Window for Dial-up

If there is no telephone number has been set for the dial-up connection, the following window appears for setting a new phone number.

Figure 3.84

Enter appropriate number in each field in the window above and click **ok** button.

Window for Network Log On

If there is a telephone number has been set for the dial-up connection, the following window appears.

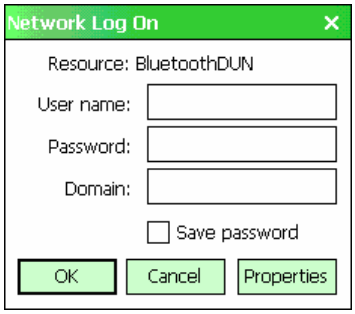


Figure 3.85

Enter a user name, password and other information in each field in the window above, and then click **ok** button to establish the dial-up connection.

Screen for Setting up Bluetooth

Clicking **Properties** button in the Network Log On window, BluetoothDUN screen appears for setting up Bluetooth related parameters.

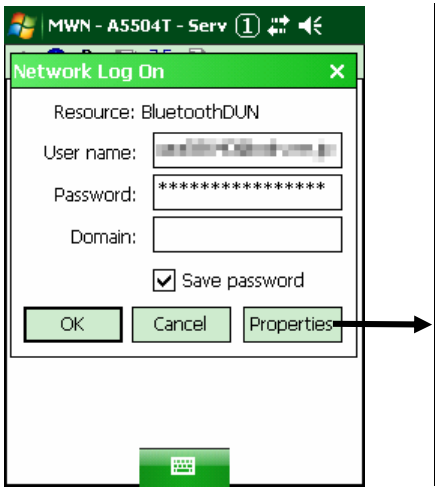


Figure 3.86

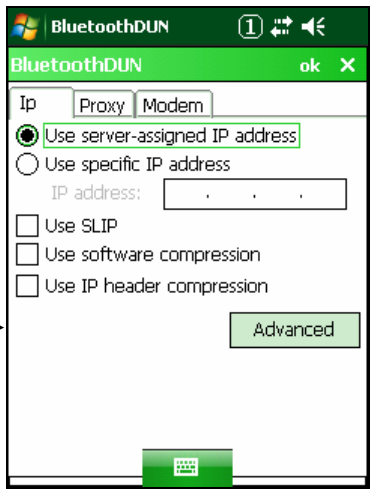


Figure 3.87

Use this BluetoothDUN setup screen to configure various parameter settings. Settings in each tab of BluetoothDUN screen are described below.

Ip Tab

This tab is used to set up TCP/IP related settings for dial-up communication.

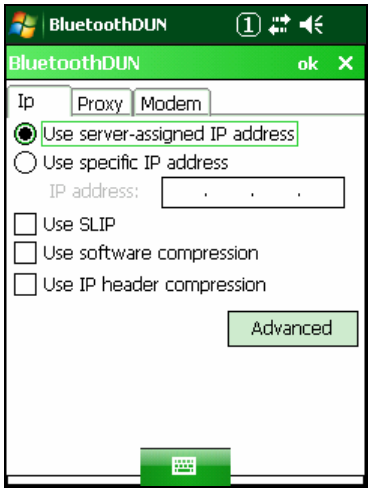


Figure 3.88

Proxy Tab

This tab is used to set up proxy related settings.

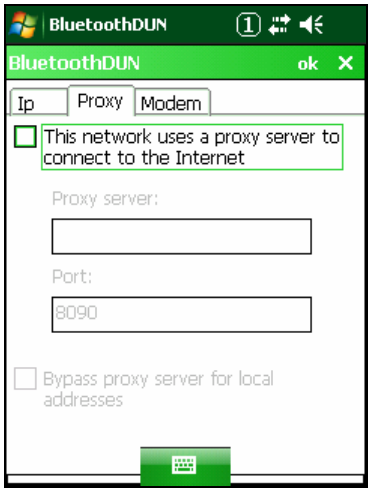


Figure 3.89

Modem Tab

This tab is used to set up modem related settings. Click **Dialing patterns …** button in Figure 3.90 to display the Dialing patterns window in Figure 3.91.

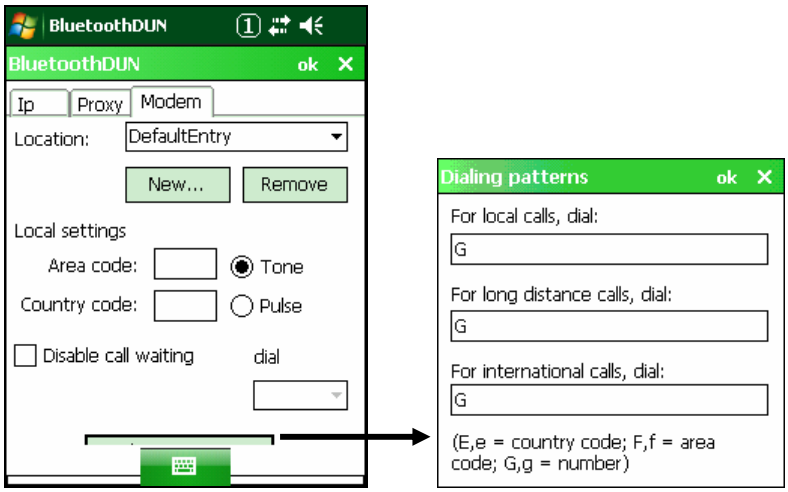


Figure 3.90 Figure 3.91

Closing the communication

After establishing connection via Dial-up Profile, click the icon in the toolbar (see Figure 3.81) to close the communication. To close the Bluetooth connection screen, click the icon in the toolbar.

Personal Area Network (PAN) Profile

Personal Area Network ("PAN") Profile establishes connection with a Bluetooth device for communication via TCP/IP protocol.

Establishing connection via Personal Area Network Profile

Double clicking the (Personal Area Network) icon will display the Bluetooth connection screen shown in Figure 3.93 indicating connection with a Bluetooth device via Personal Area Network Profile has been established.

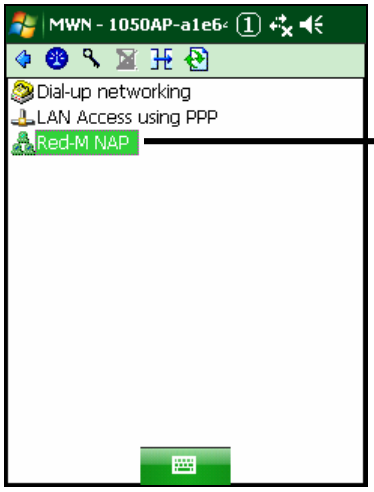


Figure 3.92

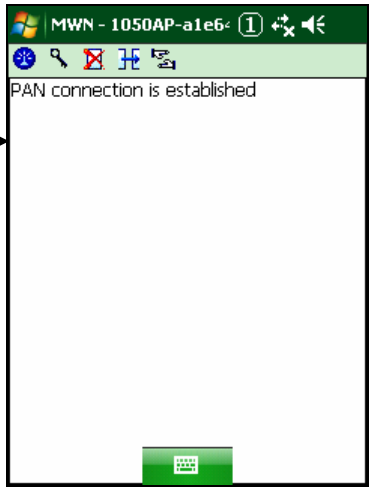


Figure 3.93

After the connection has been established, the communication application starts, and communication is performed via TCP/IP protocol.

Closing the communication

After establishing connection via PAN Profile, click the icon in the toolbar (see Figure 3.81) to close the communication. To close the Bluetooth connection screen, click the icon in the toolbar.

Changing the Network Settings

To change the network settings of Personal Area Network, navigate to **Start** → **Settings** → **Connections** tab first, and then tap **Network Cards** or tap **Wi-Fi** → **Network Adapters** tab. Tap **RX Bluetooth PAN Adapter** (see Figure 3.94) displays the setup screen (see Figure 3.95) for changing IP address and server address.

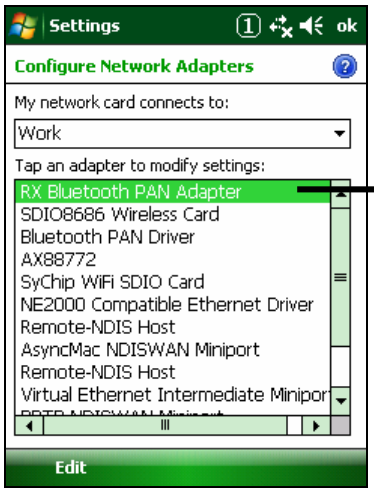


Figure 3.94

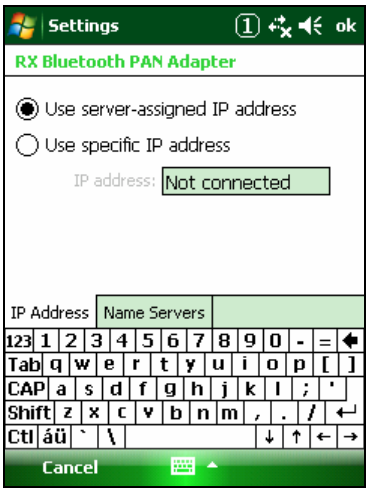


Figure 3.95

Transmitting Files via Object Push Profile

This profile enables file transmission via either Business Cards, Calendars, Email, and Note service. Double click either one of the (Business Cards) icon, (Calendars) icon, (Email) icon, and (Notes) icon to transmit files.

Note:
Before performing file transmission, file(s) that you wish to transmit must be specified.

Example of File Transmission Using "Business Cards"

Double click **Send Business card** icon (see Figure 3.96) to send the specified business card. Double click **Request Business card** to receive a business card from the partner Bluetooth device.

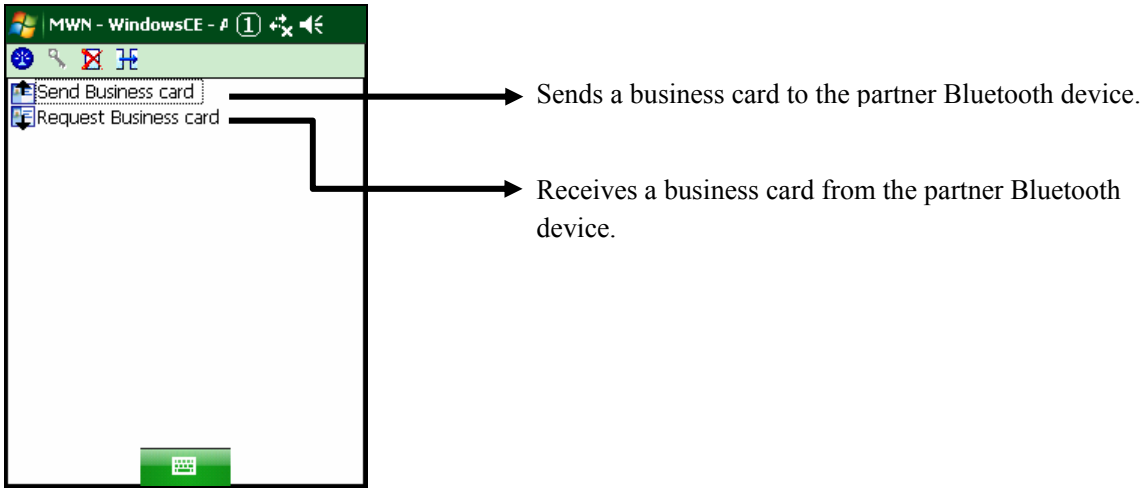

MWN - WindowsCE -
Send Business card
Request Business card
Sends a business card to the partner Bluetooth device.
Receives a business card from the partner Bluetooth device.

Figure 3.96

Handling Files via Bluetooth FTP

Handling files and folders including transmitting files can be performed using Bluetooth FTP. Double clicking the (File) icon appeared by accessing the services of Bluetooth device establishes connection with Bluetooth FTP services of the partner Bluetooth device and then displays the screen for Bluetooth FTP as shown in the following figure.

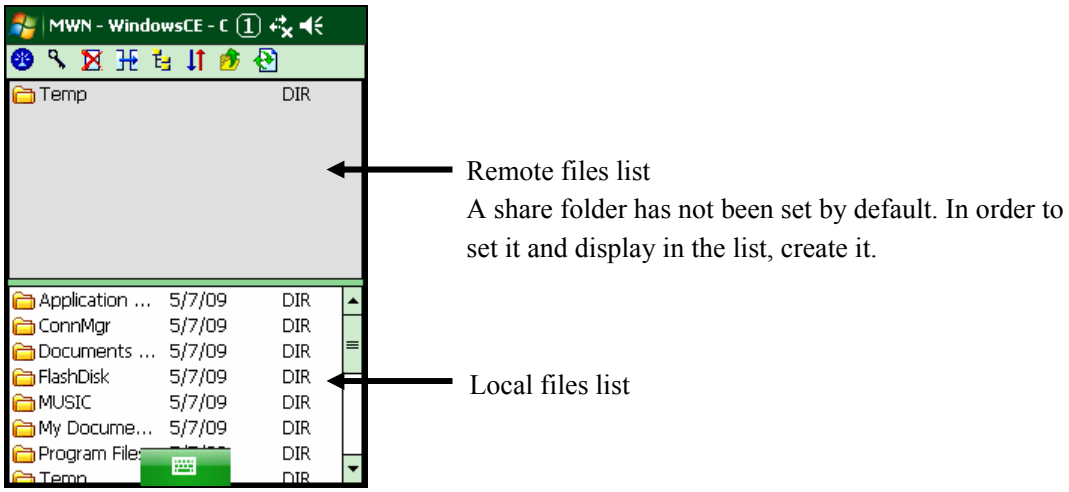

MWN - WindowsCE - C
Temp DIR
Application ... 5/7/09 DIR
ConnMgr 5/7/09 DIR
Documents ... 5/7/09 DIR
FlashDisk 5/7/09 DIR
MUSIC 5/7/09 DIR
My Docume... 5/7/09 DIR
Program File: DIR
Temp DIR
Remote files list
A share folder has not been set by default. In order to set it and display in the list, create it.
Local files list

Figure 3.97

In the screen above, the following file operations can be performed.

- Send file
- Receive file
- Move folder
- Create new folder
- Rename file
- Delete file

Configuration of the toolbar

The icons in the toolbar in the Bluetooth FTP screen are as follows.

Table 3.14 Icons in the toolbar

Icon	Description
	Displays the main menu.
	Displays the multi-menu.
	Disconnects the Bluetooth FTP connection, closes the current screen, and returns to the services screen.
	When multiple screens are open, selects and moves a screen. Returns to the services screen while the Bluetooth connection is kept established.
	Changes the display that indicates the current folder's location to a tree view.
	Changes the file sort order by either file name, date or file size.
	Moves to the folder one path up.
	Updates the files of active file list.

Configuration of the Menus

The configuration of menus of the Bluetooth FTP screen is shown below. Each menu is identical to the remote files list and local files list.

Table 3.15 Context menu (When a file is selected)

Menu	Description
Refresh	Updates the list.
Copy	Copies the selected file.
Delete	Deletes the selected file.
Direct Copy	Transfers (or copies) the selected file by performing direct copy.
Direct Move	Transfers (or moves) the selected file by performing direct move.
Rename	Changes the name of the selected file.
NewFolder	Creates a new folder.
Select All	Choose all files in the selected list.

Table 3.16 Context menu (When no file is selected)

Menu	Description
Paste	Pastes a file into the selected list.
Select All	Chooses all files in the selected list.
NewFolder	Creates a folder in the selected list.
Refresh	Updates the files.

Sending File

Choose a file in the local file list to send, and choose either **Direct Copy** or **Direct Move** menu in the context menu.

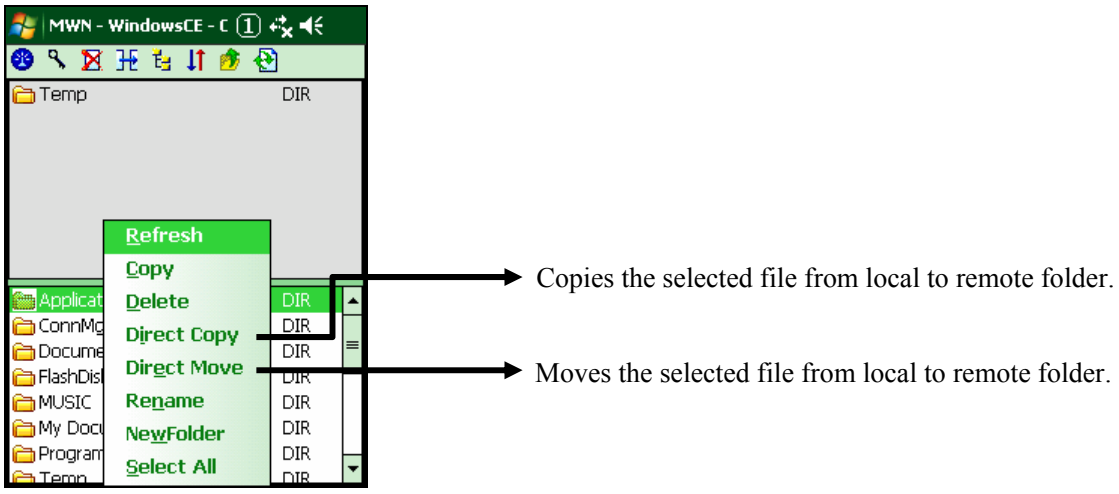


Figure 3.98

Note:
The progress indicator is shown at the bottom of the screen above while the file is being sent.

Receiving File

Choose a file in the remote file list to receive, and choose either **Direct Copy** or **Direct Move** menu in the context menu.

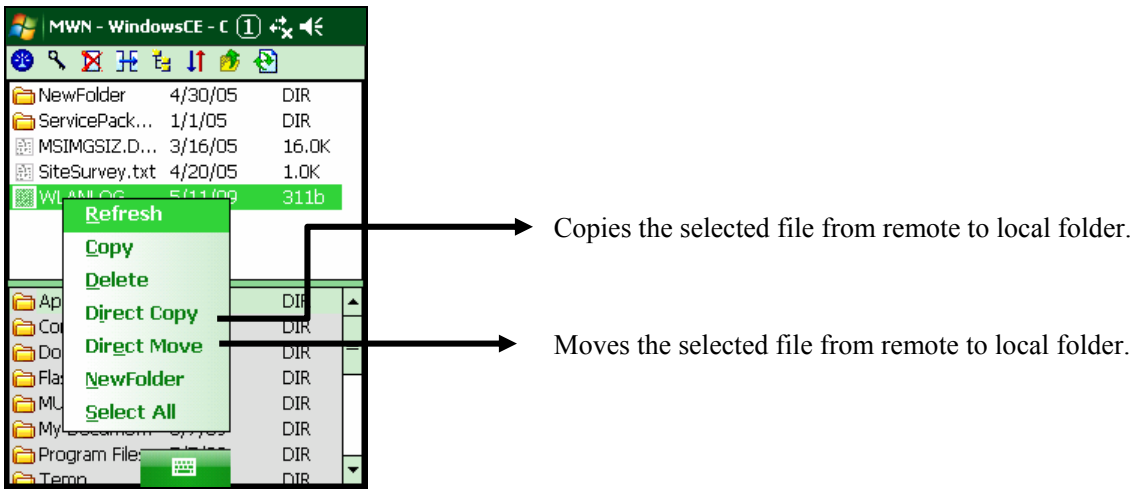


Figure 3.99

Note:
The progress indicator is shown at the bottom of the screen above while the file is being received.

Creating a New Folder

Choose **New Folder** menu in the menu of remote file list or local file list to create a new folder.

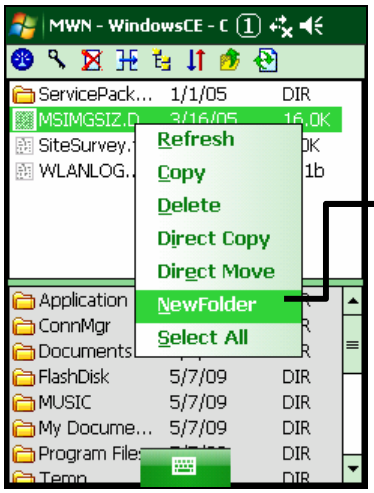


Figure 3.100

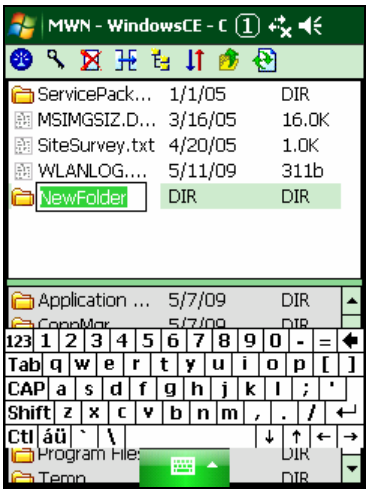


Figure 3.101

Renaming a File

Choose **Rename** menu in the menu of remote file list or local file list to change file name.

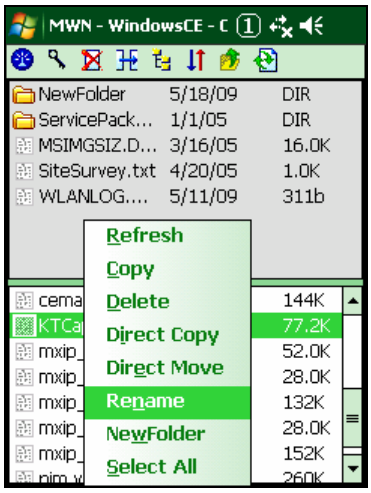


Figure 3.102

Deleting a File

Specify a file in remote files list or local files list, and choose **Delete** menu in the context menu as shown in Figure 3.103.

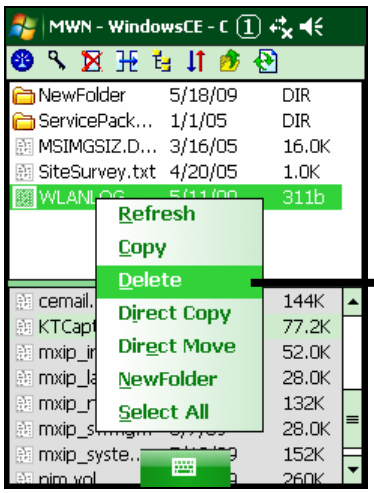


Figure 3.103

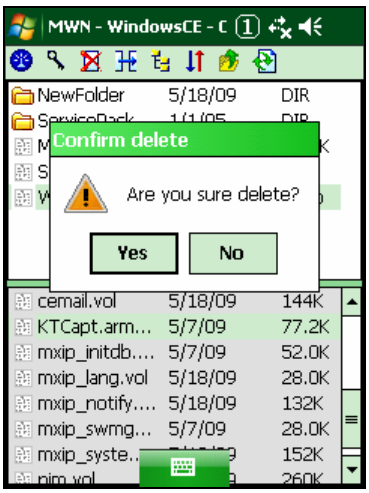


Figure 3.104

Closing connection via Bluetooth FTP

To close the established connection via Bluetooth FTP and return to the devices screen, click the icon in the toolbar to close the Bluetooth connection screen.

3.31.3 My Device

In the Devices screen, click **My Device** menu in the main menu to display the My Device screen (see Figure 3.105) for various parameter settings to set up on the Bluetooth setup tool.

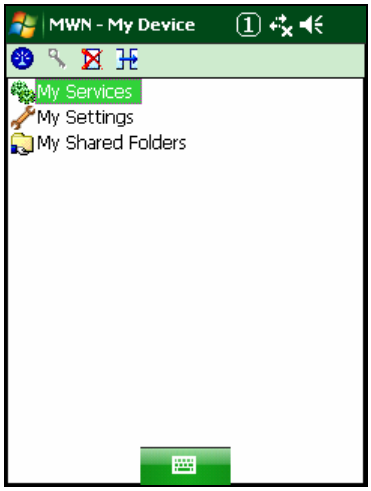


Figure 3.105 My Device screen

The icons of the services appeared in the screen are follows.

Table 3.17 Icons

Icons	Description
My Services	Chooses and sets up the available services on the terminal.
My Settings	Sets up Bluetooth setup tool.
My Shared Folders	Sets up folder to be shared via Bluetooth FTP.

My Services

Click **My Services** icon appeared in the My Device screen (see Figure 3.106) to display a list of services (Profiles) available for the Bluetooth setup tool.

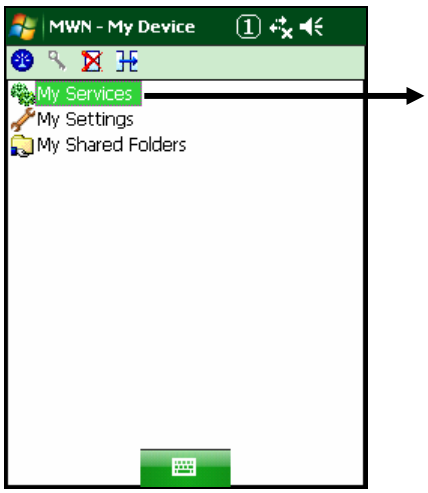


Figure 3.106

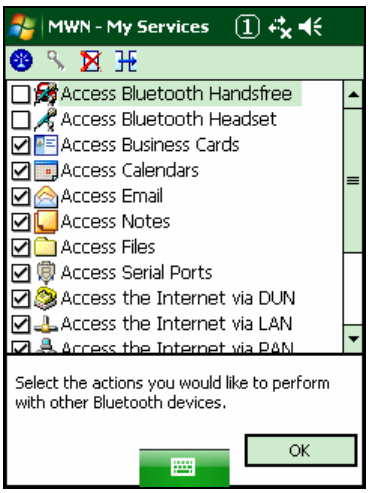


Figure 3.107

Below is a list of the services displayed in the My Services screen (see Figure 3.107).

Table 3.18 Services and the descriptions

Service		Description
	Access Business Cards	Transfers business card file (client)
	Access Calendars	Sends calendar.
	Access Email	Sends e-mail.
	Access Notes	Sends notes file.
	Access Files	Transfers file in Bluetooth FTP (client).
	Access Serial Ports	Establishes connection via Serial Port Profile (client).
	Access the Internet via DUN	Establishes connection via Dial-up Profile.
	Access the Internet via LAN	Establishes connection with Bluetooth LAN Access-Point.
	Access the Internet via PAN	Establishes connection with Bluetooth PAN Access-Point.
	Access Bluetooth Headset (Note)	Establishes connection with Bluetooth headset (client).
	Share Files	Transfers file to be shared in Bluetooth FTP (server).
	Share All PIM Items	Receives OBEX files (server).
	Share Serial Ports	Establishes connection via Serial Port Profile (server).
	Share Audio Gateway	Establishes connection with Bluetooth headset (server).

Note:
The DT-X30 does not support Bluetooth headset.

Services with each check mark are set enabled, and services without each check mark are set disabled. The disabled services in the My Services screen will not be also listed in the services on the partner Bluetooth device.

My Shared Folders

This is used to set up a folder to be shared if connection is established as server mode to communicate in Bluetooth FTP.

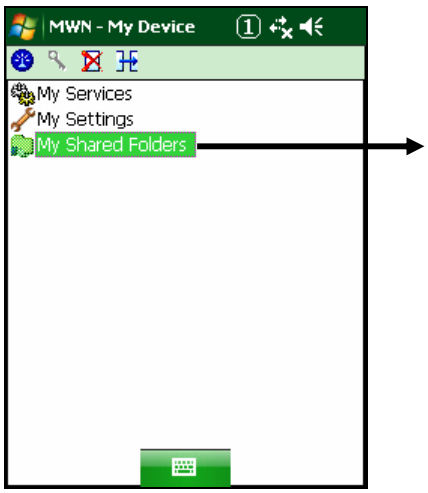


Figure 3.108

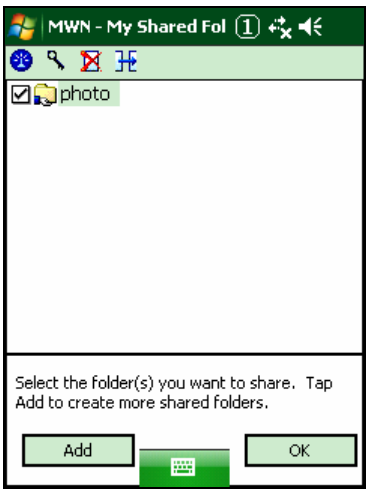


Figure 3.109

Creating a Shared Folder

Create a shared folder using a window shown in the following figure for Bluetooth FTP communication.

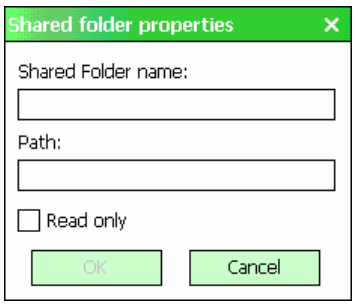


Figure 3.110

Shared Folder name

Specify the name of folder to be shared. The name specified in this field will appear when master Bluetooth device establishes connection in Bluetooth FTP.

Path

Specify the path of the shared folder. The path specified in this field will become accessible when master Bluetooth device establishes connection in Bluetooth FTP.

Read only

This checkbox sets up shared folder to be “read only folder” which does not allow a file to be written into the shared folder.

Deleting a Shared Folder

To delete a shared folder, choose **Delete** in the context menu of the shared folder in question.

My Settings

This is used to change the Bluetooth setup tool settings except settings for “My Services” and “My Shared Folders”.

Device Tab

This tab is used to specify the Bluetooth device name of the terminal in **Name** field in the following figure. If other Bluetooth device detects the terminal, the name set in this field will appear.

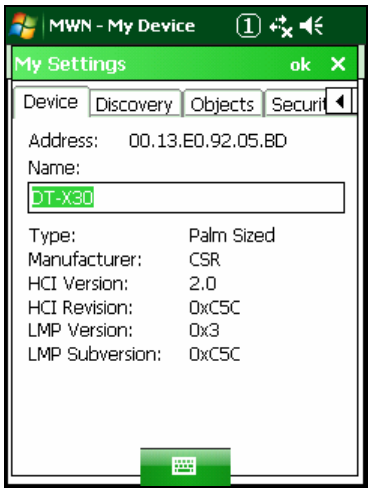


Figure 3.111

Address

Bluetooth address is indicated in this field.

Name

Bluetooth device name is specified with ASCII characters up to 100.

Type

Bluetooth device type is indicated in this field.

Discovery Tab

This tab is used to set up Bluetooth device discovery-related settings.

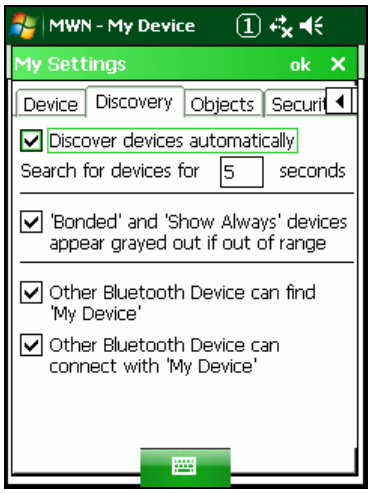


Figure 3.112

Discover devices automatically

This checkbox enables the discovery on devices to be performed automatically when the Bluetooth setup tool starts up.

Search for devices for [ ] seconds

This field is to specify a time period in seconds for performing discovery.

'Bonded' and 'Show Always' devices appear grayed out if out of range

Devices set to **Bonded** or **Show Always** will appear grayed out if they are not searched in the discovery.

Other Bluetooth Device can find 'My Device'

This checkbox allows the terminal to be searched in the discovery by other Bluetooth device when the terminal operates in the slave mode.

Other Bluetooth Device can connect with 'My Device'

This checkbox allows other Bluetooth device to establish connection with the terminal when the terminal is in the slave mode.

Objects Tab

This tab is used to set up files to be sent via OBEX file transmission.

Figure 3.113

My Inbox Location

This field is to specify the folder in which to receive files sent via Object Push communication.

Object Type

This pull-down menu chooses the type of object to send from the services, either Business Cards, Calendar, Email, or Notes.

Object Location

This pull-down menu chooses the file(s) to send corresponding to the selected type of object in **Object Type** pull-down menu.

Security Tab

This tab is used to specify the security features defined by the Bluetooth standard.

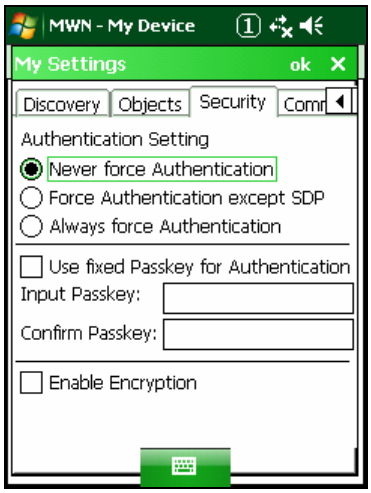


Figure 3.114

Never force Authentication

This radio button allows that authentication does not take place when the terminal establishes connection in Bluetooth.

Force Authentication except SDP

This radio button allows that authentication takes place when the terminal establishes connection in Bluetooth for other purposes than retrieving service.

Always force Authentication

This radio button allows that authentication takes place when the terminal establishes connection in Bluetooth for all purposes including retrieving service.
If this radio button is set enabled, the PassKey request dialog appears when establishing connection with other Bluetooth device.

Used fixed Passkey for Authentication

Normally, the PassKey request dialog appears when performing authentication in Bluetooth communication, but if a PassKey is set in **Input Passkey** and **Confirm Passkey** fields (see Figure 3.114), the PassKey is exchanged automatically without displaying the PassKey request dialog when establishing connection with other Bluetooth device.

Enable Encryption

This checkbox enables encryption in Bluetooth communication. If this check box is set enabled, the PassKey request dialog appears when establishing connection with other Bluetooth device.

Communication Tab

This tab is used to set up the Faster Connection and AFH (“Adaptive Frequency Hopping”) features.

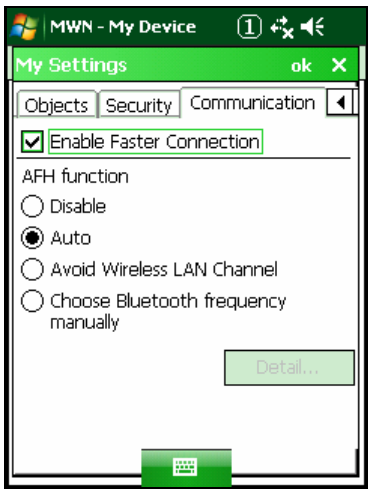


Figure 3.115

Detail Settings

If any one of **Avoid Wireless LAN Channel** and **Choose Bluetooth frequency manually** radio buttons is set enabled in the **Communication** tab, the following detail settings can be possible using the screen below.

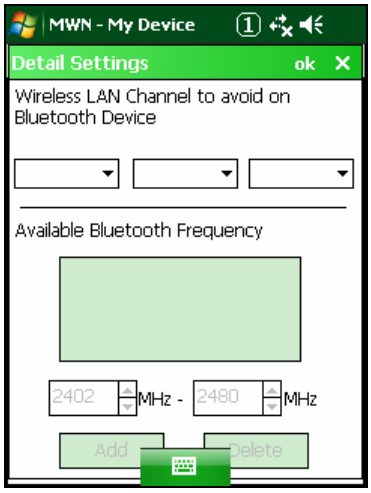


Figure 3.116

Wireless LAN Channel to avoid on Bluetooth Device

These pull-down menus are used to set a WLAN channel which does not allow a Bluetooth device to use the same channel. Maximum 3 channels can be set for WLAN channels that a Bluetooth device cannot use.

Available Bluetooth Frequency

This field is used to manually set the frequency range(s) available for Bluetooth device. Set frequency range using these pull-down menus and then click **Add** button to add it to the list. To set more than one frequency range, perform the same operation in succession. To delete a specific frequency range from the list, choose the frequency range in the list, and then click **Delete** button. The selected frequency range is deleted from the list.

Notes:

- In either case of **Avoid Wireless LAN Channel** or **Choose Bluetooth frequency manually** setting, an error occurs if the total available Bluetooth frequency range is less than 20 MHz. Set up the settings again so that there is at least 20 MHz available for Bluetooth.
- For **Avoid Wireless LAN Channel** setting, the correspondence between WLAN channel numbers and frequency ranges not available to Bluetooth is shown in the table below.

Table 3.19

WLAN channel number	Frequency range not available for Bluetooth	WLAN channel number	Frequency range not available for Bluetooth
1	2402 to 2423	8	2436 to 2458
2	2406 to 2428	9	2441 to 2463
3	2411 to 2433	10	2446 to 2468
4	2416 to 2438	11	2451 to 2473
5	2421 to 2443	12	2456 to 2478
6	2426 to 2448	13	2461 to 2480
7	2431 to 2453	14	2473 to 2480

Power settings Tab

This tab is used to display the radio frequency power of the integrated Bluetooth module.

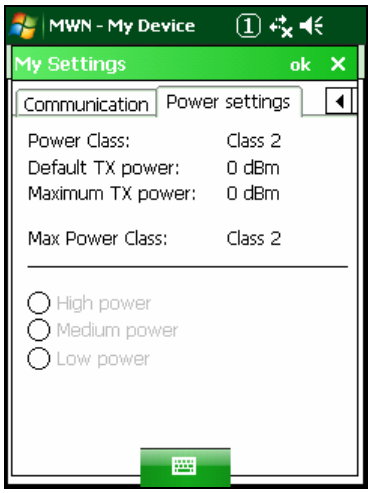


Figure 3.117

Power Class

Output power class prescribed by Bluetooth standard is shown here.

Default TX power

Radio frequency power depending on the output power class prescribed by Bluetooth standard is shown here.

Maximum TX power

The value which is the same as “Default TX power” is shown here.

Max Power Class

The value which is the same as “Power Class” is shown here.

High power, Medium power, Low power

These radio buttons are grayed out.

3.31.4 Shortcut

By registering services of specified Bluetooth device to a shortcut, the services start up automatically by double clicking the shortcut a next time. Additionally, Bluetooth connection is automatically established when the Bluetooth setup tool is initiated if the settings registered to the shortcut have been set to "Auto."

Registering Shortcut

Register shortcuts in the Services screen.

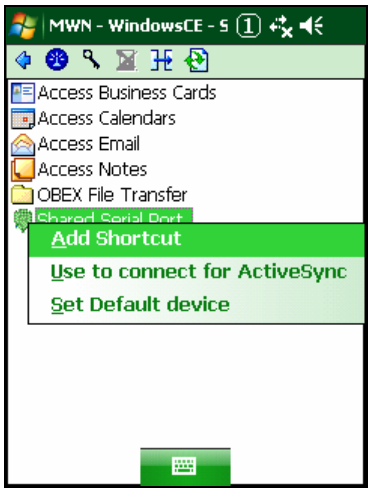


Figure 3.118

Choose the service in the Services screen above to register into shortcut, and then display either the context menu or multi-menu. Choose **Add Shortcut** menu to create a shortcut.

Establishing Connection via Shortcut

To establish a Bluetooth connection using a shortcut, access **Shortcuts** menu in the main menu to display the Shortcuts screen shown below.

Shortcuts screen

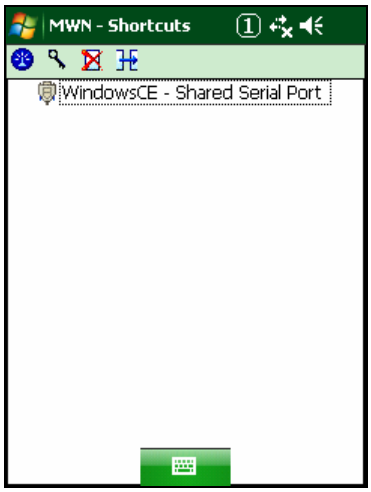


Figure 3.119

Configuration of the Menus

The menu configuration of the Shortcuts screen is the same as that of the Devices screen. The menu configuration for the context menu and multi-menu of the Shortcuts screen are shown below.

Table 3.20 Context Menu and Multi-menu

Menu	Description
Connect	Establishes a Bluetooth connection using the specified shortcut.
Delete Shortcut	Deletes the specified shortcut setting.
Connect Automatically	Sets up the specified shortcut to “Auto”.

Connect

This menu establishes a Bluetooth connection (for file transmission in the case of OBEX) in accordance with the shortcut settings. The same operation is performed by double clicking the shortcut.

Connect Automatically

If **Connect Automatically** is chosen in the context of the Shortcuts screen, a Bluetooth connection is established automatically when the Bluetooth setup tool starts up.
A star icon appears to the left of the shortcut icon that has been set to **Connect Automatically**.

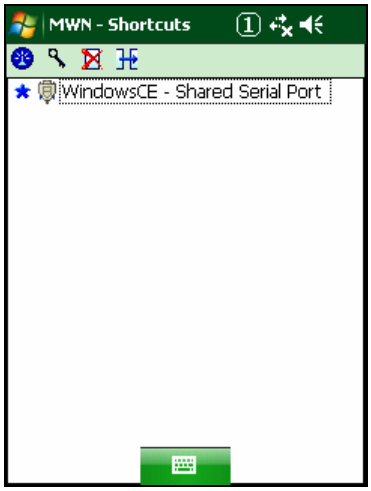


Figure 3.120

If **Connect Automatically** is selected in the context menu for a shortcut already that has been set to **Connect Automatically**, the setting to “Auto” will be set disabled.

Deleting Shortcut

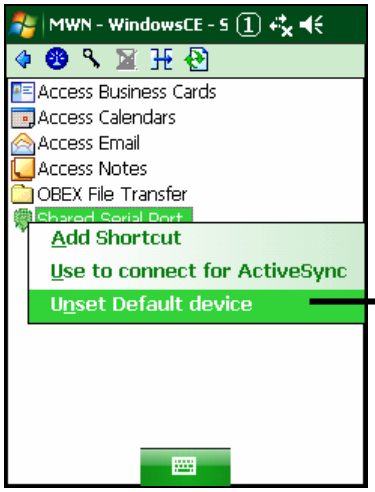
Choose **Delete Shortcut** in the context menu of the Shortcuts screen to delete the specified shortcut setting.

3.31.5 Default Devices

The **Default Devices** sets up a Bluetooth device for connection. Normally, the setting for default device must be performed using the Bluetooth Library, but the Serial/Dial-up services can be set with the Bluetooth setup tool.
Note, however, that Bluetooth setup tool can only set and delete the setting of default device; it does not establish connection with the default device. To establish connection automatically with the Bluetooth setup tool, use the feature of shortcut.

Setting up Default Device

In the Services screen, display the context menu and then choose **Set Default device**.



Clicking this menu sets up the specified device as default device.

Figure 3.121

Displaying the Default Devices

To display default devices, choose **Default devices** in the main menu (see Figure 3.122). The default devices set appears as shown in Figure 3.123.

Figure 3.122

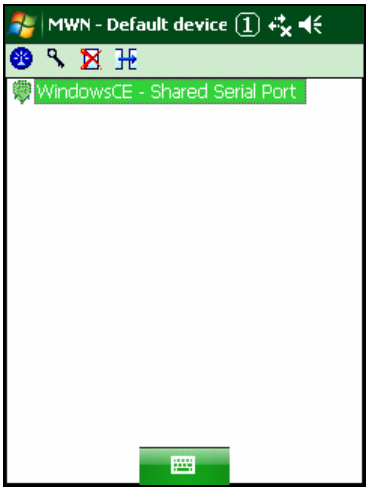
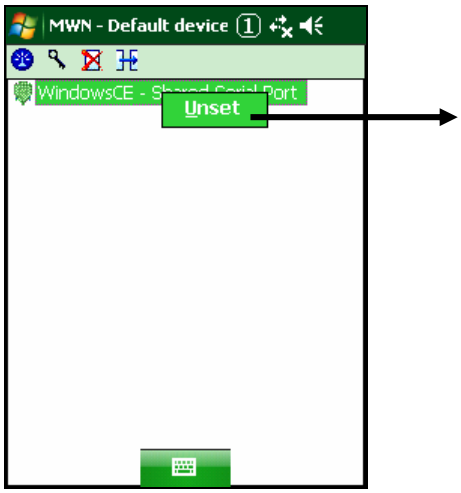


Figure 3.123

Deleting Default Device

In the Default devices screen, choose the default device you wish to delete and then display the context menu. Click **Unset** menu to delete the selected default device.



Clicking this menu deletes the setting of the specified device.

Figure 3.124

3.31.6 Setup Wizard

The Setup wizard sets up the initial settings of the Bluetooth setup tool.

Procedure for Initial Settings

In the **Devices** screen, choose **Setup Wizard** in the main menu to start the initial settings. The following four screens will appear one by one every time when **Next>** button in each screen is clicked.

1. Welcome/Bluetooth network preferences
2. My Shared Folders
3. My Services
4. Congratulations

The setting parameters in each screen are described below.

1. **Welcome/Bluetooth network preferences**
   These fields are used to enter the device name and PassKey as needed. The device name is reflected in the settings in **Device** tab. The PassKey is reflected in the settings in **Security** tab.

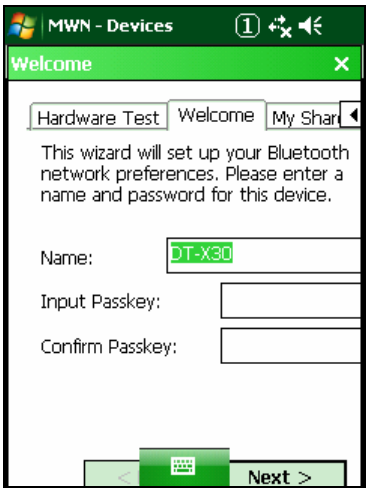


Figure 3.125

2. **My Shared Folders**

This screen is used to create a shared folder used for Bluetooth FTP communication in the server mode. Result of the settings in this screen is reflected in the settings.

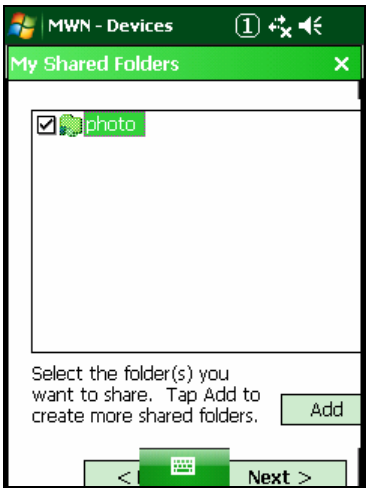


Figure 3.126

3. **My Services**

This screen is used to choose services (Profiles) used for the Bluetooth setup tool. Services with check marks are set enabled. Result of the settings in this screen is reflected in the settings.

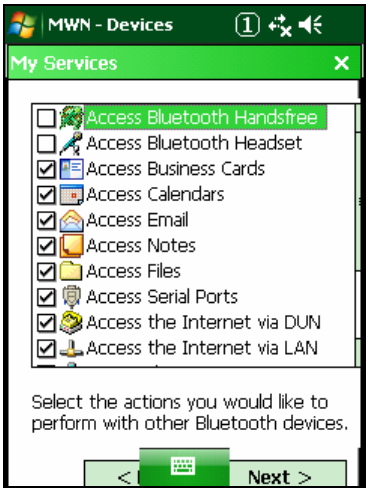


Figure 3.127

4. Congratulations

Click **Finish** button to return to the Devices screen of the Bluetooth setup tool.

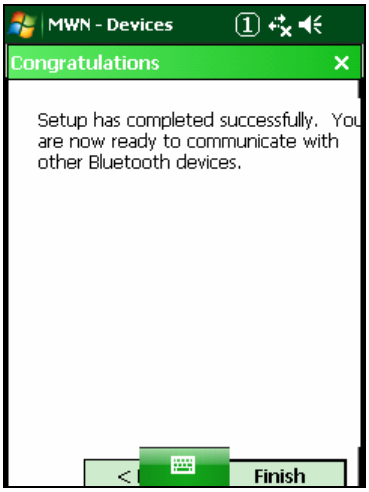


Figure 3.128

3.32 Connections

This applet is for setting up multiple network connections.

Tasks Tab

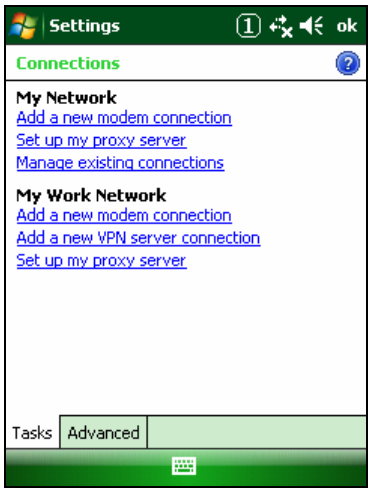


Figure 3.129

To establish connection in GPRS, refer to “WAN Settings”.

Advanced Tab

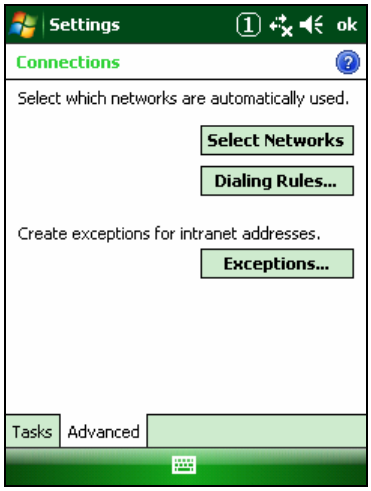


Figure 3.130

3.33 Domain Enroll

This applet is used to enroll the terminal to your company network.

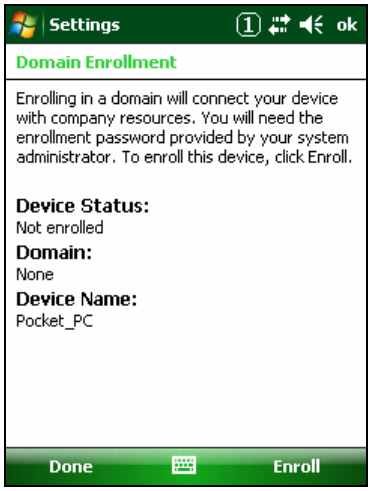


Figure 3.131

3.34 Network Cards

This applet is used to configure network adapters.

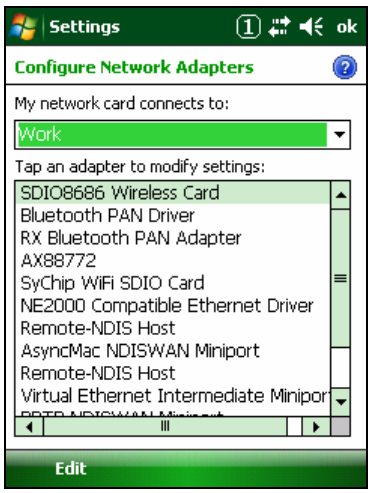


Figure 3.132

The installed network adapter drivers are listed here.
Tap the adapter that you want to configure.

Note:
In some cases, this applet is displayed as the "**Network Adapter**" tab of the "**Wireless** Configuration" applet.

3.35 USB to PC

This applet is for enabling advanced network functionality.

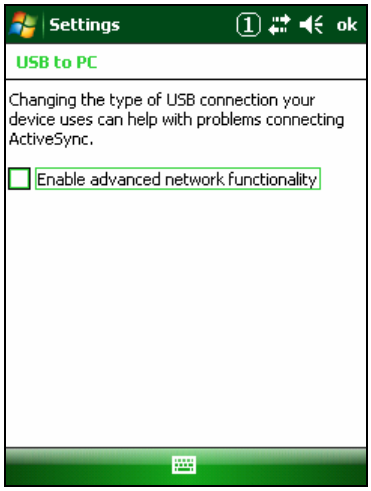

Settings
ok
USB to PC
Changing the type of USB connection your device uses can help with problems connecting ActiveSync.
Enable advanced network functionality

Figure 3.133

To troubleshoot an ActiveSync cable connection, select **Enable advanced network functionality** checkbox.

3.36 WAN Settings

This tool performs the WAN module power source settings, security settings, identification data settings, operator settings and status display.

Power Tab

This tab is to perform the WAN module power source ON/OFF settings.

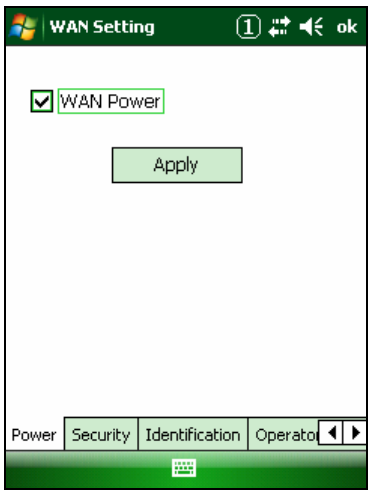


Figure 3.134

WAN Power

This checkbox configures the WAN module power source to ON or OFF.

Apply Button

This button applies the settings selected in the checkbox.

Security Tab

This tab provides the following functions according to the current SIM lock mode (unlock mode, PIN input standby mode or PUK input standby mode).
SIM “Enable” or “Disable” setting is carried out in the Unlock mode. It is also possible to change the PIN code. A PIN code must be entered twice to change it.

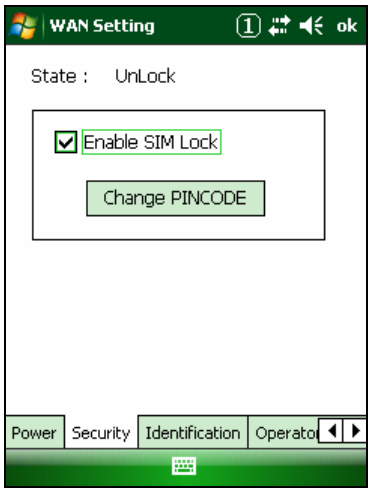


Figure 3.135

State

The current SIM lock status is shown as “UnLock”.

Enable SIM Lock

This checkbox sets the SIM lock to “Enable” or “Disable”. This configuration can only be disabled by bringing up the PIN code input dialog box and entering the correct PIN code.

Change PINCODE Button

This button displays the new PIN code dialog box where new PIN codes can be entered.

The SIM status can be changed to “Lock” by entering the correct PIN code in the PIN input standby mode.

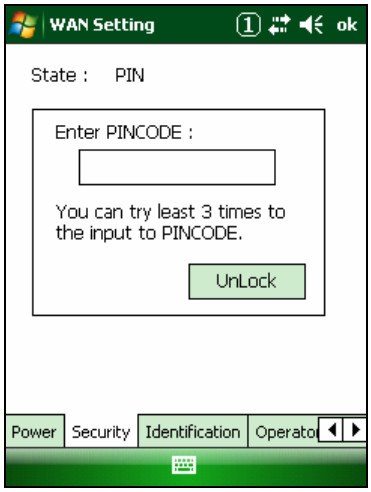


Figure 3.136

State

The current SIM lock status is shown as “PIN”.

Enter PINCODE

Input the PIN code to change the lock status to “UnLock”.

PIN Counter

This displays the PIN code entry count for the current status.

UnLock Button

Entering the correct PIN code and clicking the “Enter PIN Code” box changes the lock status to “UnLock”. If an incorrect PIN code is entered, the “PIN Counter” is revised and an error message appears.

A new PIN code can be set by entering the correct PUK code in the PUK input standby mode. The PIN code must be entered twice for a new PIN code to be set.

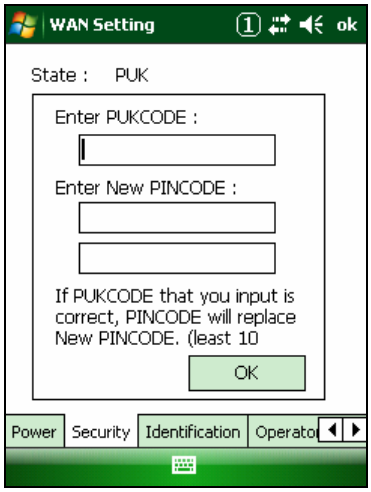


Figure 3.137

State

The current SIM lock status is shown as “PUK”.

Enter PUKCODE

Input the PUK code to reset the PIN code.

Enter New PINCODE

To reset the PIN code, enter the new PIN code then re-enter it in the second field for confirmation.

PIN Counter

This displays the PIN code entry count for the current status.

OK Button

Press this button to set the new PIN code. An error message appears if a wrong PUK code is entered.

Identification Tab

This tab displays the following identification data for the WAN module and the SIM card.

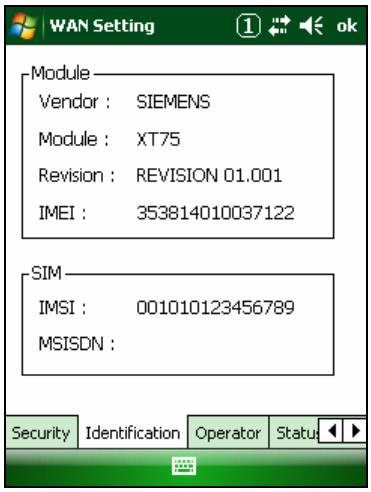


Figure 3.138

Vendor

This displays the name of the WAN module manufacturer.

Module

This displays the model number of the WAN module.

Revision

This displays the GSM/GPRS module revision number.

IMEI

This displays the telephone's unique number (International Mobile Equipment Identity).

IMSI

This displays the subscriber's identifier (International Mobile Subscriber Identity). The number is shown as "---" when the SIM lock is enabled.

MSISDN

This displays the telephone number (Mobile Subscriber ISDN Number). The number is shown as "---" when the SIM lock is enabled.

Operator Tab

This tab enables the method of connecting the terminal with the operator (automatic connection, manual connection or adapt mode) to be set. The display screen changes depending on the present connection method setting.

If the current Connect mode is set to Auto, the connection mode can be set.

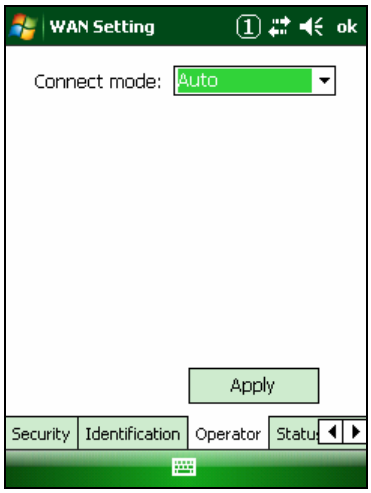


Figure 3.139

Connect mode

Choose the method for connecting the terminal with the operator in the pull-down menu.

Apply Button

Enables the changes made on this screen.

If the connection method is set to manual connection or adapt mode, seeking is performed to locate connectable operators and the results are listed. The operators to be connected can then be selected from this list. Alternatively, a connection can be established with an operator by directly inputting their operator ID.

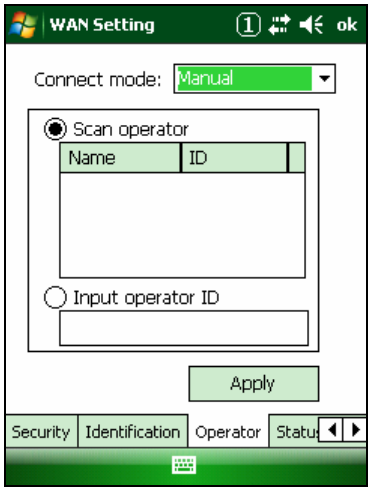


Figure 3.140

Connect mode
Choose the method for connecting the terminal with the operator in the pull-down menu.

Scan operator
This retrieves operators which can be connected (default).

Scan operator list
This displays a list of the connectable operator names and IDs.

Input operator ID
This radio button enables direct input of the operator to be connected. Selecting this item cancels the operator scan.

Input operator ID
This radio button enables direct input of the ID of the operator to be connected.

Apply Button
This button applies the changes made on this screen.

Status Tab

This tab displays the following information on the signal strength, operator connection and network.

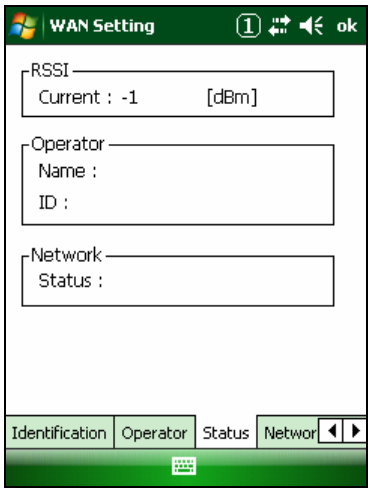


Figure 3.141

Current

This indicates the current received signal strength.

Name

This displays the name of the operator who is currently connected.

ID

This displays the ID of the operator who is currently connected.

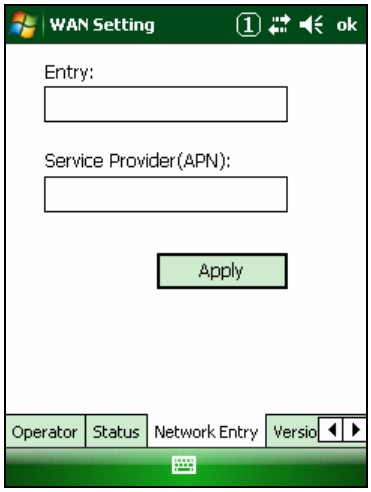
Status

This displays one of the current statuses for the WAN module.

- Available GPRS → GPRS is supported
- Attached GPRS → Connected via GPRS
- Available EGPRS → EGPRS (EDGE) is supported
- Attached EGPRS → Connected via EGPRS (EDGE)
- Not available GPRS/EGPRS → Not supported

Network Entry Tab

This tab is for setting the Access Point Name of the service provider.



Entry

Input a connection name.

Service Provider(APN)

Input the Access Point Name from the service provider.

Apply Button

This button applies the settings entered in this tab.

For use of this tab in detail, refer to **Establishing GPRS Connection**.

Version Tab

This tab displays the WAN configuration version.

Establishing GPRS Connection

To establish GPRS connection, follow the steps below.

1. Configure the WAN power to ON using the WAN Settings tool.
2. Set the SIM lock disable using the WAN Settings tool.
3. Choose the operator using the WAN Settings tool.
4. Create a new connection using the WAN Settings tool.
5. Edit the connection settings using the Connections tool.
6. Establish GPRS connection using the Connections tool.

Note:
With the WANGPRS Library, it is possible to develop an application that supports above the actions.

The following shows the GPRS connection process in detail.

Step 1: Configure the WAN power to ON using the WAN Settings tool

1. Navigate to **Start** → **Settings** → **Connections** tab and then double tap **WAN Setting** icon. **WAN Setting** screen shown below appears.

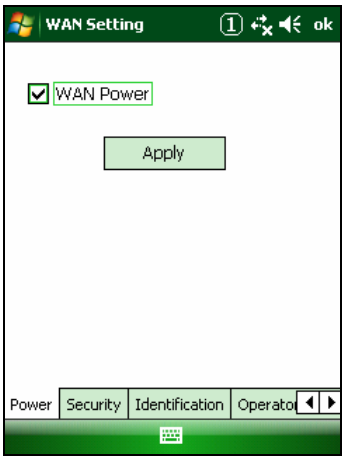


Figure 3.142

2. Check **WAN Power** checkbox and tap **Apply** button.

Step 2: Set the SIM lock disable using the WAN Settings tool

1. Dismount the check from the **Enable SIM Lock**. If the SIM lock mode is set effect, reset the PIN lock by inputting the correct PIN code in **Security** tab. The SIM lock mode is reset.
2. If the current SIM lock status shows "UnLock" in **State** field (see Figure 3.143), it is not necessary to reset the PIN lock because the PIN lock function is not used.

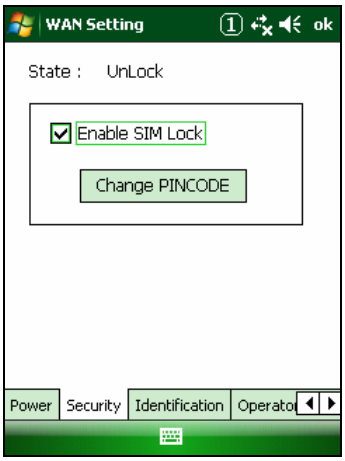


Figure 3.143

3. If the current SIM lock status shows "PIN" in **State** field (see Figure 3.144), it is necessary to reset the PIN lock. Input the correct PIN code in **Enter PINCODE** edit box and tap **Unlock** button. After entering the correct PIN code, the SIM lock status will show "UnLock" in **State** field indicating the PIN lock state is reset.

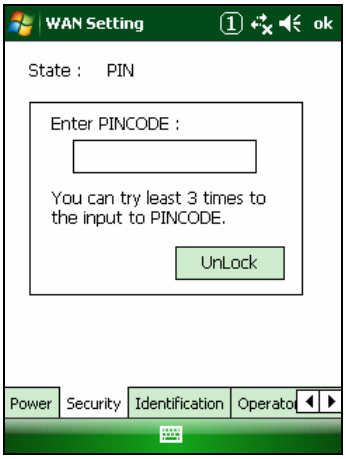


Figure 3.144

Note:
The limited number of inputting your PIN code is indicated underneath **Enter PINCODE** edit box (see Figure 3.144). In any case your PIN code entry exceeds over this limitation, the PIN status changes to "PUK". This indicates you need to contact your SIM card supplier to obtain PUK code. While you are entering PIN code, pay your attention not to exceed the limitation.

Step 3: Choose the operator using the WAN Settings tool

1. Choose your suitable operator in **Connect mode** field (see Figure 3.145) to establish connection with the terminal by enumerating in **Operator** tab.

Auto mode:

The Auto mode is to establish connection with an operator by referring to the operator list saved in the SIM card. If you wish to set your operator in this mode, choose **Auto** in **Connect mode** combo box and tap **Apply** button.

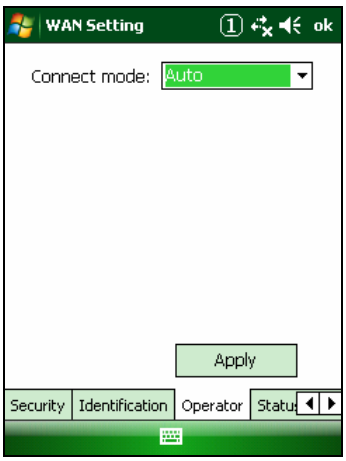


Figure 3.145

Manual mode:

Choose **Manual** in **Connect mode** pull-down menu. And check **Scan operator** radio button and choose an operator in **Scan operator** list box, or check **Input operator ID** radio button and input an operator ID in the edit box. Tap **Apply** button.

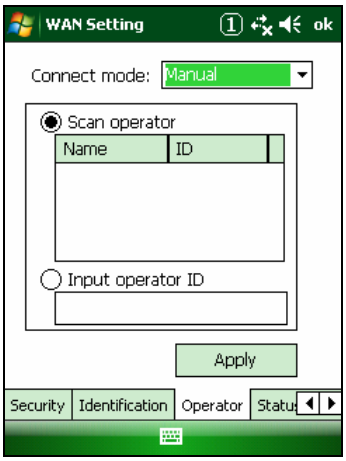


Figure 3.146

Adaptive mode:

Choose **Adapt** in **Connection mode** pull-down menu. Follow the setting procedure detailed in the Manual mode to choose your operator. With this Adaptive mode, if you fail to establish connection, the connection mode is automatically changed to the Auto mode.

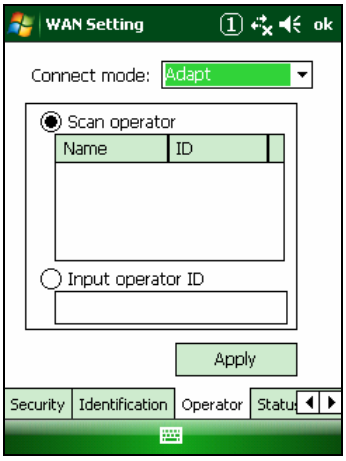


Figure 3.147

Step 4: Create a new connection using the WAN Settings tool

1. On the WAN Settings screen, select **Network Entry** tab.
2. Specify a connection name in the **ENTRY** edit box.
3. Specify the Access Point Name in the **Service Provider (APN)** edit box.

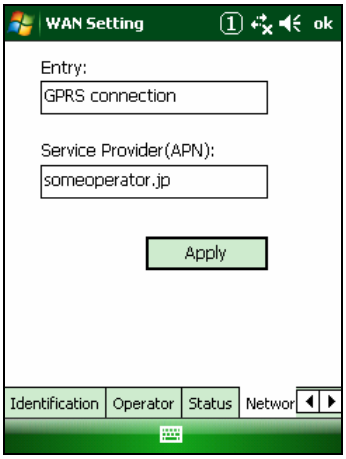


Figure 3.148

4. Tap **Apply** button.
5. Tap **ok** to exit WAN Settings.

Step 5: Edit the connection settings using the Connections tool.

1. Navigate to **Start** → **Settings** → **Connections** tab and then double tap **Connections** icon.

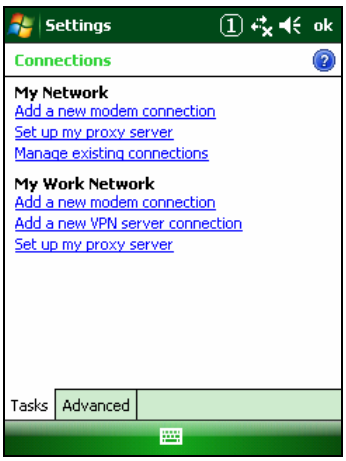


Figure 3.149

2. Under **My Network**, tap **Manage existing connections**. The connection name specified in step 4 appears.

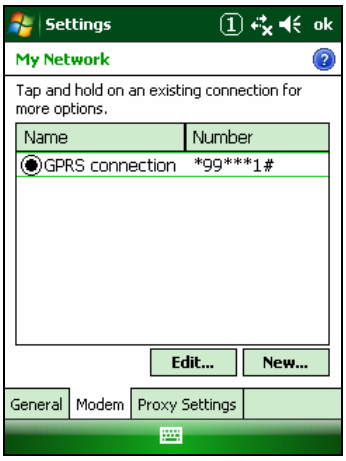


Figure 3.150

3. Tap **Edit...** button. The screen shown below appears.

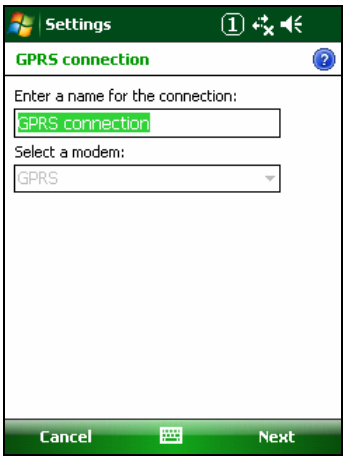


Figure 3.151

4. Tap **Next**. The screen shown below appears.

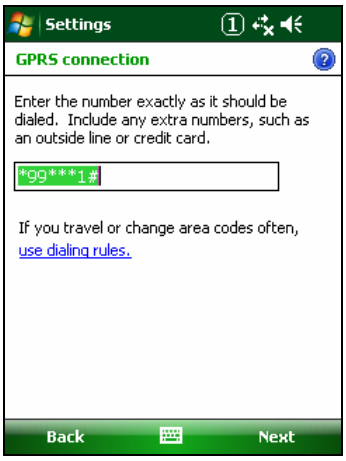

Settings
GPRS connection
Enter the number exactly as it should be dialed. Include any extra numbers, such as an outside line or credit card.
*99***1#
If you travel or change area codes often,
use dialing rules.
Back
Next

Figure 3.152

5. Tap **Next**. The screen shown below appears.

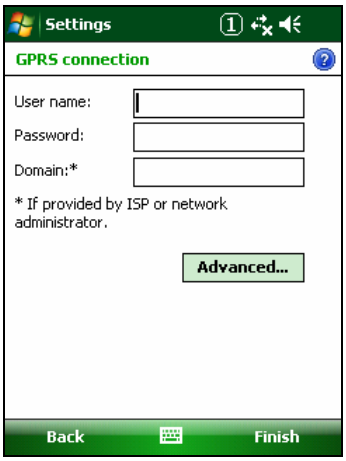


Figure 3.153

6. Specify **User name**, **Password**, and **Domain** if required by the service provider.
7. Tap **Advanced** button. The screen shown below appears.

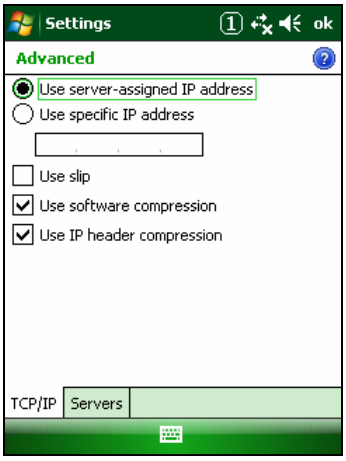


Figure 3.154

8. Check **Use specific IP address** checkbox and set IP address if required by the service provider.
9. Tap **Servers** tab. The screen shown below appears.

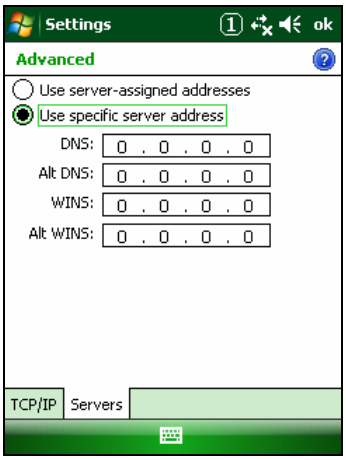


Figure 3.155

10. Check **Use specific server address** checkbox and set IP addresses if required by the service provider.
11. Tap **ok** to return.
12. Tap **Finish**.

Step 6: Establish GPRS connection using the Connections tool

1. Navigate to **Start** → **Settings** → **Connections** tab and then double tap **Connections** icon.

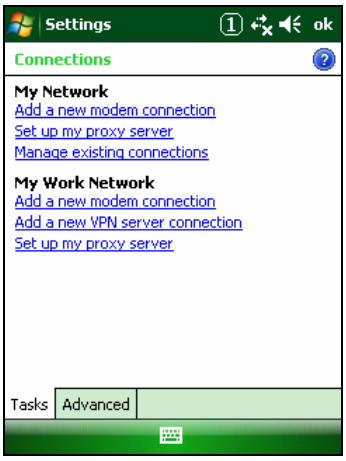


Figure 3.156

2. Under **My Network**, tap **Manage existing connections**. The connection name entered in step 4 appears.

3. Tap and hold the connection name until a popup menu appears. Select **Connect**.

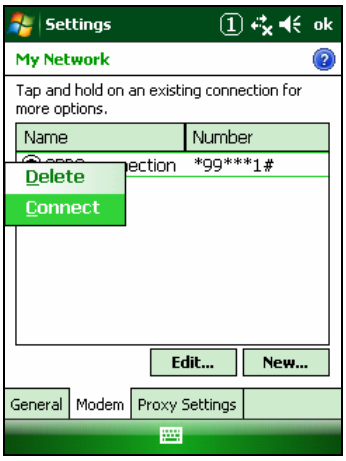


Figure 3.157

4. When the connection is established, the icon in the title bar changes to the icon. To confirm the status of the connection, tap the icon. A balloon window shown below appears. Now you can communicate with the operator via TCP/IP.

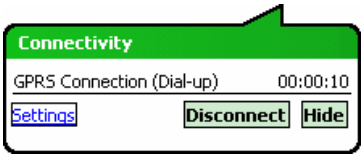


Figure 3.158

3.37 Wireless Manager

This applet is for enabling, disabling, and configuring all the wireless capabilities.

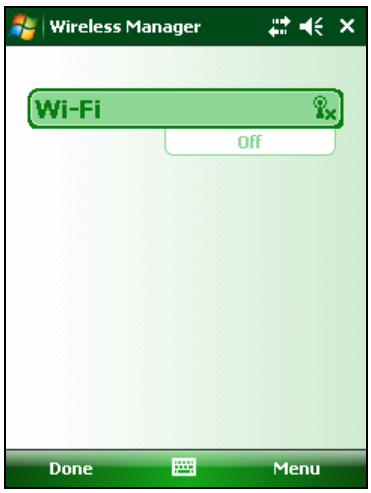


Figure 3.159

3.38 Wireless Configuration

This applet is used to configure wireless networks.

Wireless Tab

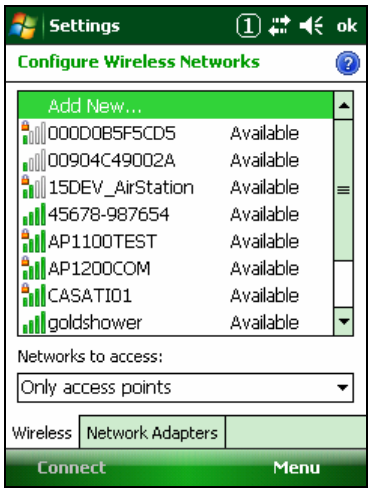


Figure 3.160

Network Adapters Tab

This tab is used to configure network adapters.

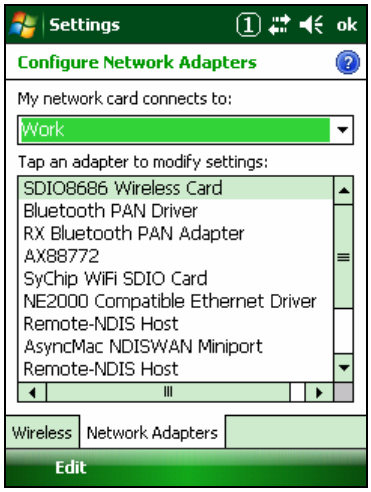


Figure 3.161

Note:
In some cases, this tab appears as the "**Network Cards**" applet.

3.39 WLAN Power

This applet is to set up the settings for power to the integrated WLAN module and to display the detected status of the power.

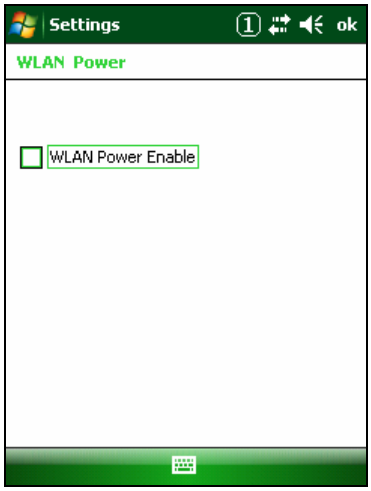


Figure 3.162

WLAN Power Enable

Check this box to supply the power to the integrated WLAN module.

3.40 WLAN Settings

This applet is to set up the parameters for WLAN configuration.

The **WLANConfig** setting tool starts up by displaying the WLAN settings stored in the **ini** file if it exists in the terminal, or the default WLAN settings if the file does not exist, and then displays **IP** tab.

IP Tab

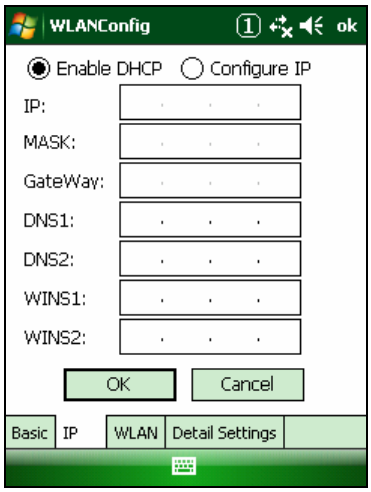


Figure 3.163

Basic Tab

This tab sets up SSID and Security. Click the radio button of Authentication to set “Open” for WEP. Choose either 128 bit radio button or 64 bit radio button for Key Length. For Key Index, up to four kinds of key can be registered.

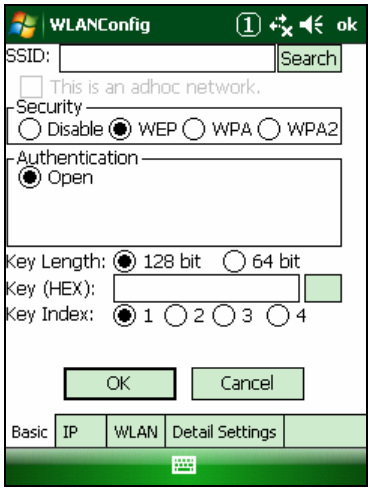


Figure 3.164

Search Button

This button invokes the **NetSearch** utility.

Security, Authentication

Choose one of the four radio buttons in the **Security** field. By clicking **WPA** or **WPA2** radio button, authentication in either **PSK**, **EAP-PEAP**, or **EAP-TLS** can be set up. If **PSK** is selected in **Authentication**, input a key in the **Key** field to register.

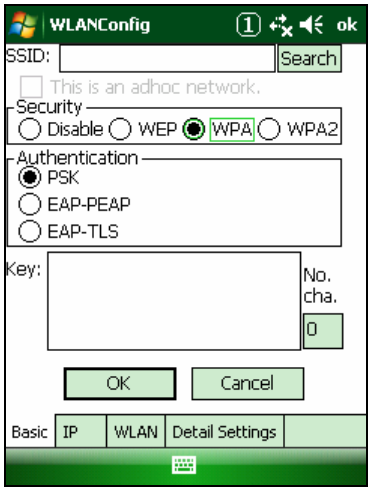


Figure 3.165

If **EAP-PEAP** or **EAP-TLS** is selected, user name, domain validate server, and etc. can be set up.

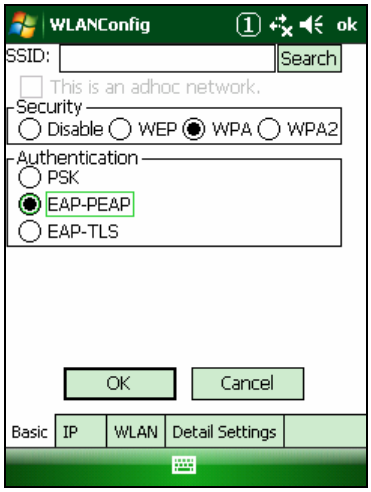


Figure 3.166

WLAN Tab

This tab sets up the basic WLAN settings such as power to the WLAN module, power save mode, WLAN standard, and the threshold level (RSSI level) of roaming.

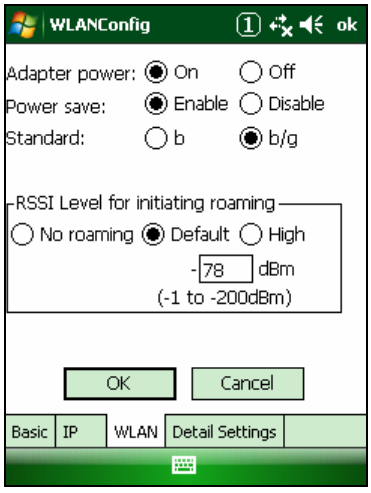


Figure 3.167

Detail Settings Tab

This tab sets up the detailed settings. It sets up whether or not to show popup window when WLAN is not connected to a network. AdHoc connection, all security settings and a comment for the configuration file ("ini" file) can also be set up. For **Advance Settings** and **Version** buttons, refer to the explanation below.

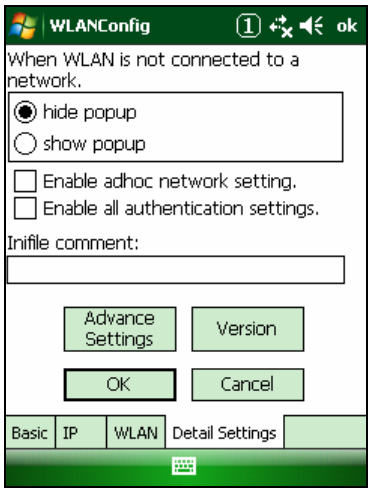


Figure 3.168

Advance Settings Button

This button displays a window of **Advance Settings**. The window sets up frequency channels from nos. 1 to 13 (see note) used in WLAN operation and detailed settings for roaming.

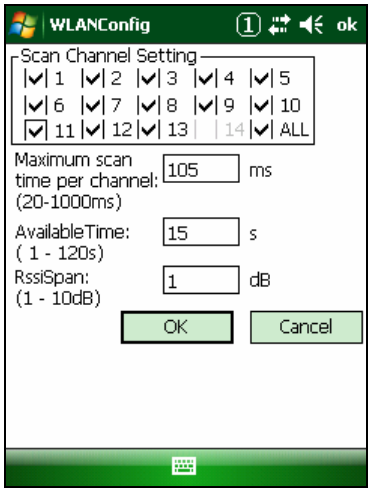


Figure 3.169

Note:
The relevant European standard ("ETSI") limits the number of channels to 13 only.

Version Button

This button displays version information about the application currently running.

Figure 3.170

If **ok** button in Figure 3.169 is clicked, following “Inifile Save Options” screen appears. This screen is to save the settings you made on each tab of **Basic**, **IP**, **WLAN**, and **Detail** of the WLANConfig tool. Clicking **OK** button saves the settings made on the four tabs to the ini file, and then starts up the terminal to run in WLAN operation. Or, clicking **Cancel** button saves the settings to the ini file, but does not start up the terminal. The settings do not become effect until when a reset on the terminal is performed a next time.

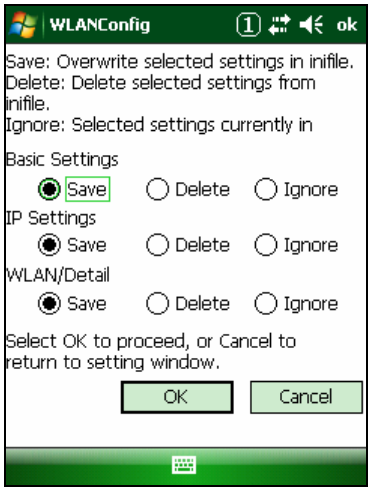


Figure 3.171

4. Application Programs

Once an application program is launched by navigating to **Start** → **Programs** menu, the application's operation menu is displayed to continue the process.
The following are the application programs implemented in the terminal

Table 4.1

Name	Description	CASIO	MS
Today	Default screen	--	Yes
Games	Solitaire and Bubble Breaker	--	Yes
ActiveSync	ActiveSync client	--	Yes
Backup Tool	Backs up and restores user data to/from FlashDisk.	Yes	--
Calculator	Nine-digit calculator	--	Yes
Calendar	Personal appointment management tool	--	Yes
Contacts	Personal contact management tool	--	Yes
Copy Devices	Copies user data between two terminals.	Yes	--
File Explorer	File management program	--	Yes
FLCE	Client for data upload and download	Yes	--
Getting Started	Shortcut menus for setting up the terminal	--	Yes
GPS Information	Positioning information	Yes	--
Image Scanner Demo	Demonstrates the features of scanning bar codes.	Yes	--
Image Scanner Read	Scans bar codes.	Yes	--
Internet Explorer	Displays web pages for Internet and Intranet.	--	Yes
Internet Sharing	Enables your PC to use the terminal as a modem.	--	Yes
Laser Scanner Demo	Demonstrates the features of scanning bar codes.	Yes	--
Laser Scanner Read	Scans bar codes.	Yes	--

Continue.

	Messaging	Electronic mail client	--	Yes
	Messenger	Windows Live Messenger	--	Yes
	Mobile Camera	Captures and displays static images.	Yes	--
	NetSearch	Displays a list of partners via WLAN.	Yes	--
	Notes	Takes a quick note.	--	Yes
	Pictures & Videos	Shows digital pictures & videos.	--	Yes
	Remote Desktop Mobile	Remote desktop client.	--	Yes
	Search	Searches for files and other items.	--	Yes
	Task Manager	Displays running programs.	--	Yes
	Tasks	Personal task management tool	--	Yes
	Windows Live	Windows Live client	--	Yes
	Windows Media	Windows Media Player	--	Yes

MS; Microsoft

4.1 Today

When you turn on the terminal for the first time each day, you'll see the Today screen. You can also display it by tapping the Today's icon. On the Today screen, you can see important information at a glance for the day.

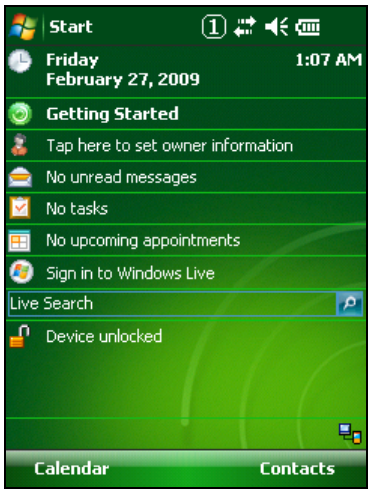


Figure 4.1

4.2 Games

The terminal comes with two games; Solitaire and Bubble Breaker.

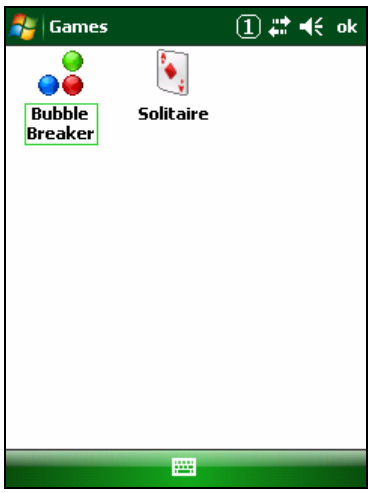


Figure 4.2

4.3 ActiveSync

This application is an ActiveSync client program for the terminal to communicate with PC.

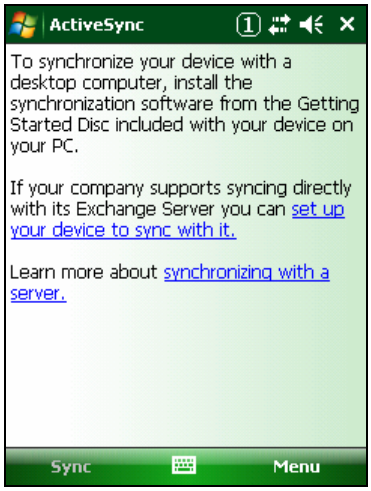

ActiveSync
To synchronize your device with a desktop computer, install the synchronization software from the Getting Started Disc included with your device on your PC.
If your company supports syncing directly with its Exchange Server you can set up your device to sync with it.
Learn more about synchronizing with a server.
Sync
Menu

Figure 4.3

4.4 Backup Tool

This tool backs up user's data into the memory card and then restores it to deploy the backed up data in the terminal.

Applicable data for backup and restoration with the tool

- Files on the FlashDisk (except OS components)
- Registry
- Received mails
- Cookie of browser and temporally files
- Certificates

Note:
Changed sizes of the memory area, password and stylus correction related information are not backed up.

Medium to restore data;
Memory card (micro SD, …), FlashDisk folder of the device

Password for back up process

For security purpose, a password can be set which is required at a time of starting up the backup process. This password does not allow backed up data in memory card to be restored unless it is correctly entered when the restoration is initiated.
Note that the password does not also allow automatic restoration with the automatic backup tool if password has been set.

Backup Process

1. Navigate to **Programs** → **Utility** and then double click **Backup Tool** icon. The screen appears. Choose a memory card in the pull-down menu and click **Backup now** button.

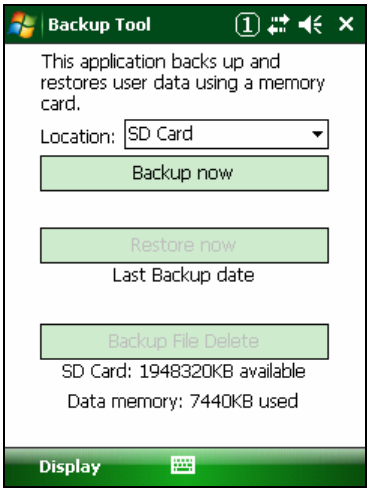


Figure 4.4

2. If you require a password to set in the screen appeared after clicking **Backup now** button, enter a password in **Password** field and then press F3 key (= Tab key) to confirm. Enter the same password in **Confirm Password** field and then press F2 key (= Back Tab keys). Click **Yes** button to complete the entering of password. Otherwise **No** button to return to the previous screen.

3. If you choose **Yes** button in the step above, **Backup in Progress** screen appears and the backup process is initiated. While the backup continues, do not operate any key on the keyboard or on the right and left sides.

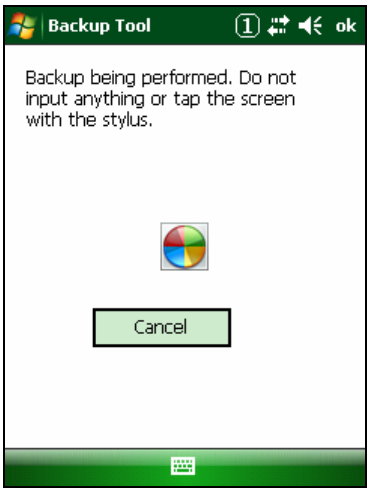


Figure 4.5

4. When the backup is complete, a buzzer sounds in a short period indicating the completion. Click **ok** button in the popup message screen.

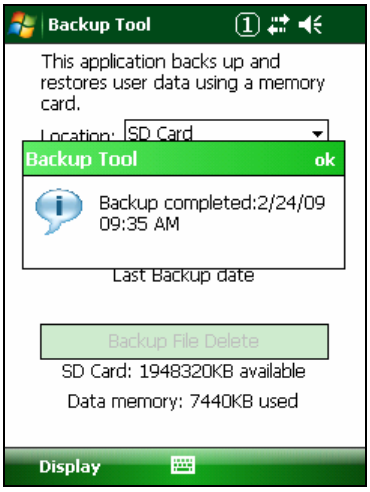


Figure 4.6

Restoration Process

1. Press **Restore now** button.

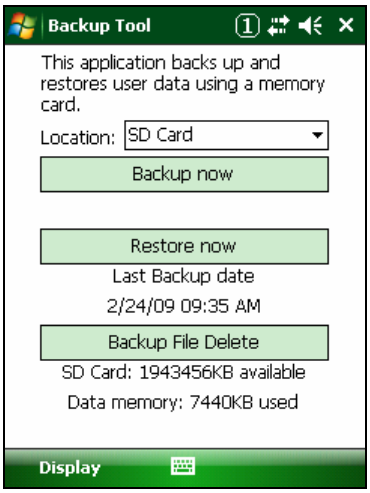


Figure 4.7

2. Enter the same password in **Password** field if it has been set up at a time of the backup process and click **Yes** button. Or, click **No** button to return to the previous screen.

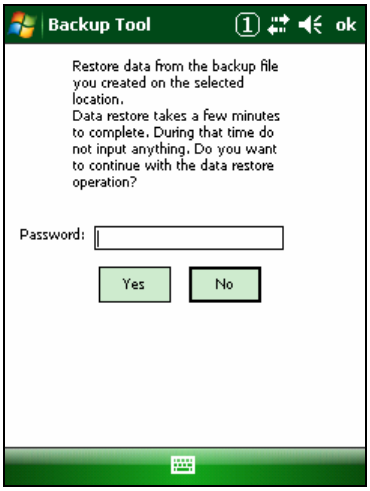

Backup Tool
ok
Restore data from the backup file you created on the selected location.
Data restore takes a few minutes to complete. During that time do not input anything. Do you want to continue with the data restore operation?
Password:
Yes
No

Figure 4.8

3. If you choose **Yes** button in Figure 4.8, **Restore in Progress** dialogue screen appears indicating the initiation of restoration. While this screen is being appeared, do not operate any key on the keyboard or on the right and left sides.

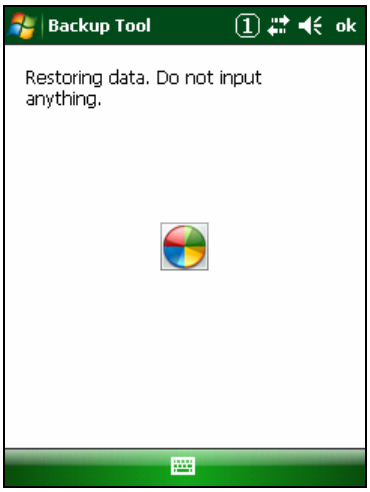


Figure 4.9

4. When the restoration is complete, a buzzer sounds in a short period indicating the completion. Click **ok** button in the popup message screen and **X** button at upper-right corner in the screen to close the tool.

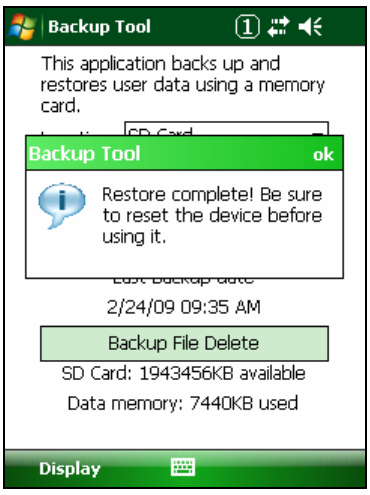

Backup Tool
This application backs up and restores user data using a memory card.
Backup Tool
ok
Restore complete! Be sure to reset the device before using it.
2/24/09 09:35 AM
Backup File Delete
SD Card: 1943456KB available
Data memory: 7440KB used
Display

Figure 4.10

Initiating the tool at command line

The following explains how to initiate the backup tool at command line.

```
CF_Backup.exe <option> <target> [<password>]
```

Parameters in the command line;

option

B: Specify the backup process.
R: Specify the restoration process.

In the <option> field, specify either B or R. Character of the selection to enter is not case-sensitive.

target

Storage directory of backup file

password

A password to set up if required.

Notes:

- Depending on the size of data to back up or to restore, it may take a few ten seconds to a few minutes.
- To carry out the backup and restoration processes, it is recommended to use the dedicated AC Adaptor (AD-S42120B) to power the terminal via cradle.

Troubleshooting

Table 4.2 Error messages

Process	Error message	Cause
Backup	Memory backup was cancelled because no storage card is loaded or because of insufficient storage card capacity. Correct the problem and try again.	There should be a file still kept being opened.
	An error occurred while writing the backup file to card. Return to the menu, delete the backup file that was created, and try again.	Due to insufficient memory capacity, temporary file of the backup file cannot be saved in mid-course.
	Memory backup was cancelled due to low battery power! Replace batteries and try it again.	Due to low battery power, the backup file cannot be saved.
Restoration	Restore failed because the data file could not be written.	Due to insufficient memory capacity, temporary file of the backup file and the backup file cannot be exchanged.
	Restore failed because the backup file could not be read.	Backup file cannot be read due to the corruption of the file.
	Restore was cancelled due to low battery power! Replace batteries and try it again.	Due to low battery power, the backup file cannot be read.
	The password was not correctly confirmed. Be sure that the confirmation password exactly matches the password.	The password entered does not match to the password created in the backup process.

4.5 Calculator

The application can be used to operate nine-digit calculator.

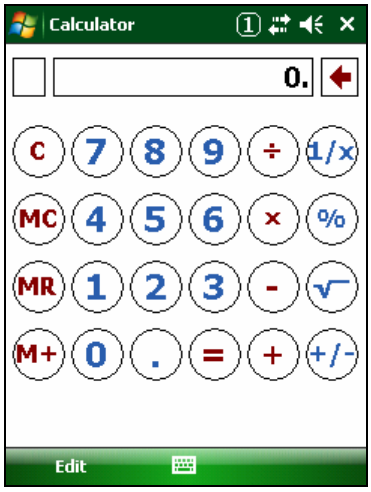


Figure 4.11

4.6 Calendar

Calendar is a program that helps you manage your schedule. Appointments and meetings in the Calendar can be viewed using a variety of different formats, and you can set alarms to notify you of upcoming appointment times.

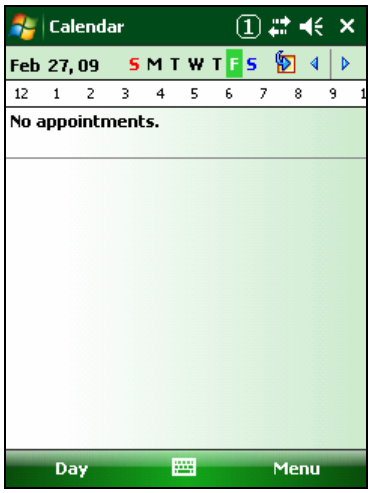


Figure 4.12

To create a new Appointment, navigate to **Menu** → **New Appointment**.

Table 4.3 Menus in the application

Menu	Description
Day	Switches to the Day view.
Week	Switches to the Day view.
Month	Switches to the Week view.
Year	Switches to the Month view.
Agenda	Switches to the Agenda view.
Menu	
New Appointment	Creates a new Appointment.
Beam Appointment ...	Sends the selected Appointment via IrDA or Bluetooth.
Delete Appointment	Deletes the selected Appointment.
Reply	
Reply	Replies the meeting notice.
Reply All	Replies the meeting notice to all attendees.
Go to Today	Displays the Appointments of today.
Go to Date	Displays the Appointments of specified day.
Edit	
Cut	Cuts the selected Appointment.
Copy	Copies the selected Appointment.
Paste	Pastes the Appointment that are cut or copied.
Tool	
Options ...	Sets up options for Appointment.
View	
Agenda	Switches to the Agenda view.
Day	Switches to the Day view.
Week	Switches to the Week view.
Month	Switches to the Month view.
Year	Switches to the Year view.
Filter	
All Appointments	Displays all Appointments.
No Categories	Displays all Appointments with no category.

4.7 Contacts

Use Contacts to store and manage the names, addresses, phone numbers, and email addresses of friends, co-workers, customers, etc.

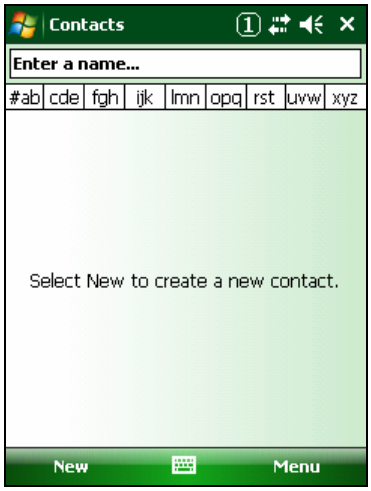


Figure 4.13

To create a new Contact, tap **New**.

To find a contact, do one of the following:

- Begin entering a name in the provided text box until the contact you want is displayed.
- Use the alphabetical index displayed at the top of the contact list.
- Filter the list by category. In the contact list, navigate to **Menu** → **Filter**.

Table 4.4 Menus in the application

Menu			Description
New			Creates a new Contact.
Menu			
	Edit		Edits the selected Contact.
	Send Contact		
		Beam	Sends the selected Contact via IrDA or Bluetooth.
	Copy Contact		Copies the selected Contact.
	Delete Contact		Deletes the selected Contact.
	Options ...		Sets up options for Contact.
	View By		
		Name	Displays contact list sorted by name.
		Company	Displays contact list sorted by company.
	Filter		
		All Contacts	Displays all Contacts.
		Recently Viewed	Displays Contacts you have recently added, edited, or viewed.
		No Categories	Displays all Contacts with no category.
	Select Contacts		
		Several	Select several Contacts.
		All	Select all Contacts.

4.8 Copy Devices

This application copies various settings and applications installed in one terminal (master terminal) to another (child terminals).

Contents to be copied

Table 4.5

Objective	Content	Remarks
FlashDisk	All files (except OS components) in the FlashDisk.	

Note:
To make the master terminal and child terminals in the mirror state, the content in FlashDisk must be reset prior to performing **Copy Devices**.

Procedure for copying between terminals

The following is the procedure for copying data on the master terminal to child terminals.

On master terminal

1. Click **Send Start** button.

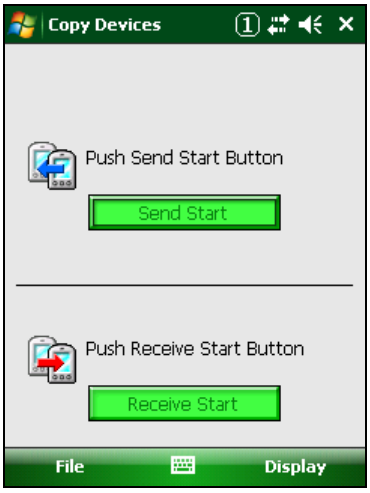


Figure 4.14

2. The following screen appears while the master terminal is transmitting data.

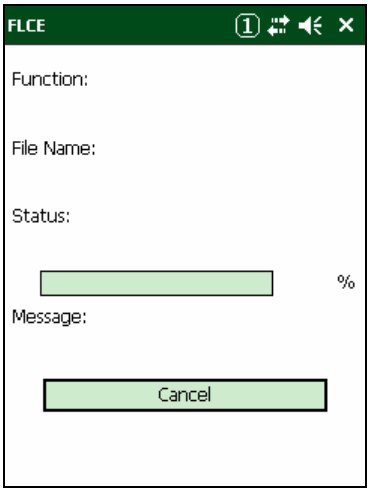


Figure 4.15

On child terminals

1. To receive data from the master terminal, click **Receive Start** button on each child terminal (if multiple terminals are to receive the same data.).

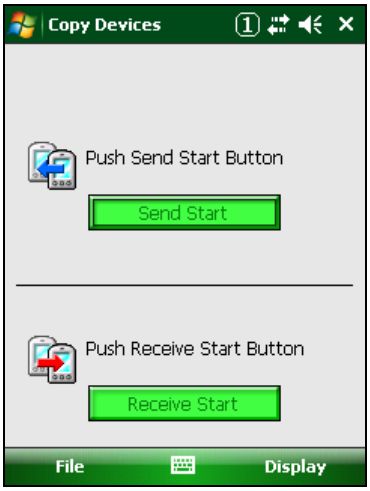


Figure 4.16

2. On the child terminal, the following screen appears while the child terminal is receiving data.

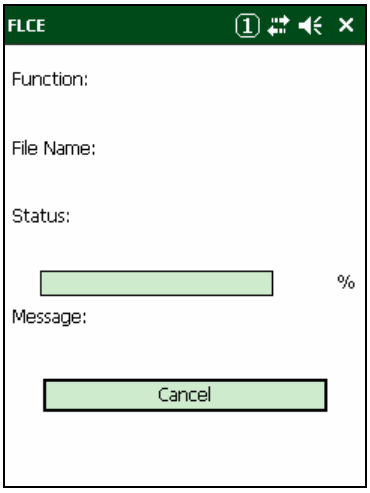


Figure 4.17

4.9 File Explorer

This application is a file management program. It can copy files, transmit files, delete files, create folders and delete folders.

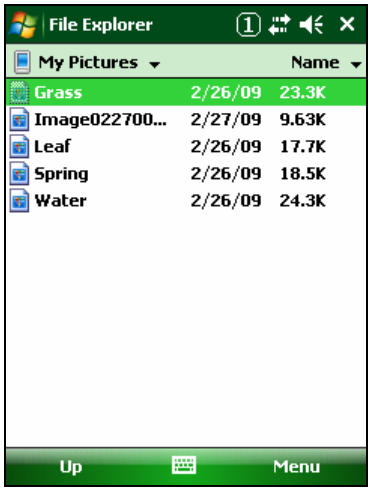


Figure 4.18

Table 4.6 Menus in the application

Menu			Description
Up			Opens the parent folder.
Menu			
	Go To		
		My Documents	Opens the My Documents folder.
		My Device	Opens the root folder.
		Folders ...	Opens the upper folder.
		Open Path	Opens the network share.
	Refresh		Updates the list with latest information.
	Show All Files		Displays all files.
	Sort By		
		Name	Displays the list sorted by name.
		date	Displays the list sorted by date.
		Size	Displays the list sorted by size.
		Type	Displays the list sorted by file type.
	Send ...		Creates a new e-mail message with the selected file attached.
	Beam File ...		Sends the selected file via IrDA or Bluetooth.
	New Folder		Creates a new folder.
	Rename		Changes the specified file and folder names.
	Delete		Deletes the specified file and folder.
	Edit		
		Undo	Returns to the previous operation.
		Cut	Cuts the selected file and folder.
		Copy	Copies the selected file and folder.
		Paste	Pastes the file and folder that are cut or copied.
		Paste Shortcut	Creates a shortcut for the file and folder that are cut or copied.
		Select All	Chooses all the files and folders that are displayed.

4.10 FLCE

This application enables the terminal to communicate with a PC with the LMWIN utility being running. The communication between the terminal and the PC is established via cradle.

Input Command Line Screen

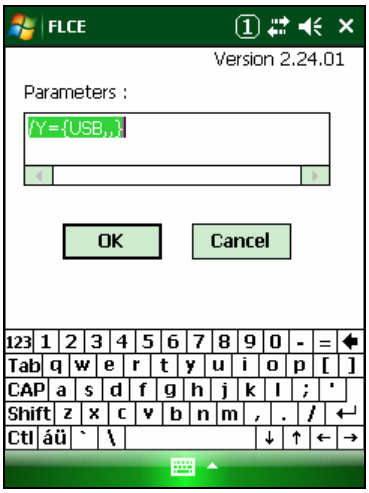


Figure 4.19

Screen during Transmission

While the communication continues, the following screen will appear. Refer to LMWIN Utility Manual available separately for detail of the operation.

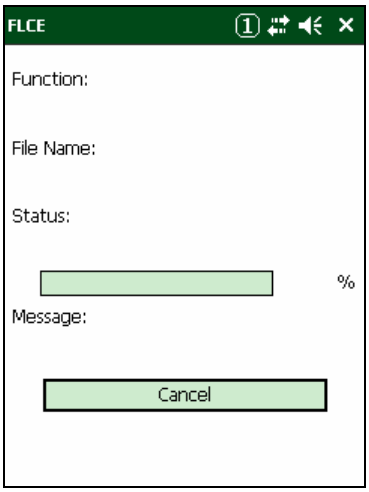


Figure 4.20

4.11 Getting Started

This application displays shortcut menus for setting up the terminal.

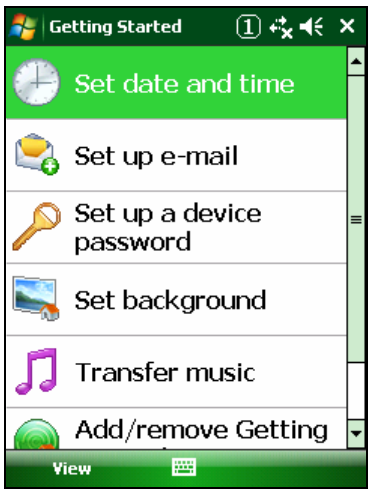


Figure 4.21

4.12 GPS Information

This application displays the positioning information and satellite information retrieved by the GPS module integrated in the terminal (model dependant).

Status Tab

This tab displays the information of the satellite from which the signal is being received.

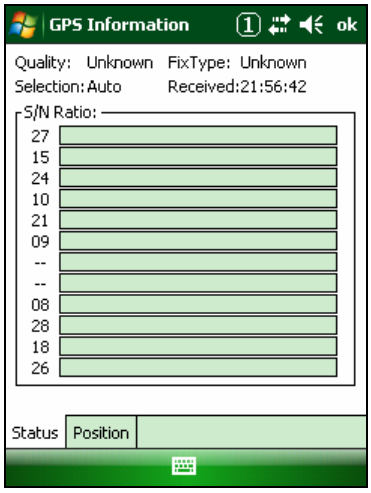


Figure 4.22

Quality

This displays the object subject to positioning. ”GPS” is displayed if the power to the GPS module is on.

Selection

”Auto” is displayed if the power to the GPS module is on.

FixType

This displays the reliability of the positioning data. Either “3D”, “2D” or “−” is shown which means either three or two-dimensional positioning or that positioning is not possible.

Received

This displays the time of the most recent GPS positioning.

S/N Radio

The satellite number is shown on the left while the intensity of that satellite’s signal is indicated in the bar. The stronger the signal is, the further the bar moves towards the right edge of the screen.

Position Tab

This tab displays the position of the satellite from which the signal is being received.

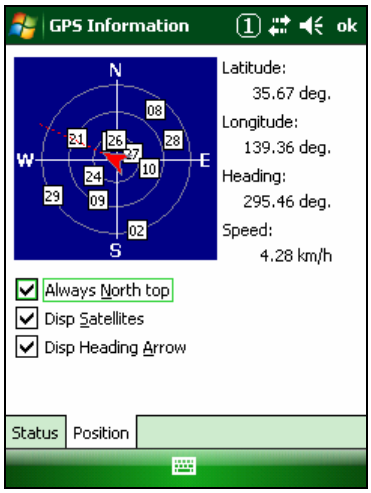


Figure 4.23

Latitude

This displays the latitude of the positioning results.

Longitude

This displays the longitude of the positioning results.

Heading

This displays the traveling direction of the positioning results.

Speed

This displays the traveling speed of the positioning results.

Always North top

In the Check mode, the displayed direction is always shown with north on top. When the Check mode is turned off, the traveling direction is shown on top.

Disp Satellites

In the Check mode, the satellite position is displayed as a white circle containing the satellite's number. When the Check mode is turned off, the satellite position is not displayed.

Disp Heading Arrow

The traveling direction is displayed as a red arrow in the Check mode. When the Check mode is turned off, the red arrow is not displayed.

4.13 Image Scanner Demo

This application demonstrates the performances of reading 1D and 2D symbologies with the integrated CMOS Imager (applicable to models with the integrated Imager). The application consists of four menus;

- Single Decode
- Multi Decode
- Image Capture
- Sign Capture

Single Decode

This mode reads a single bar code symbol every time one of the Trigger keys is pressed and then displays scanned bar code, symbology name and the no. of digits. To exit this mode, tap **Quit** button.

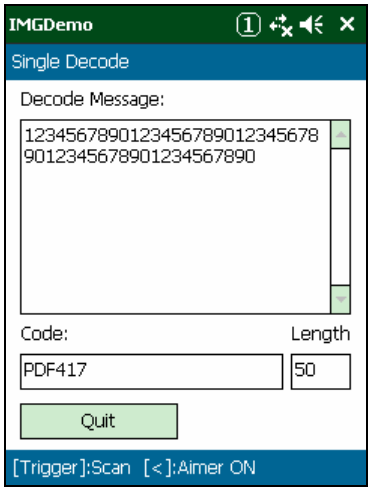


Figure 4.24

Multi Decode

This mode reads specified number of bar code symbols at a time and then displays each scanned bar code in the respective boxes in the following figure. The number of symbols to continuously scan can be specified is either 2, 3 or 4.

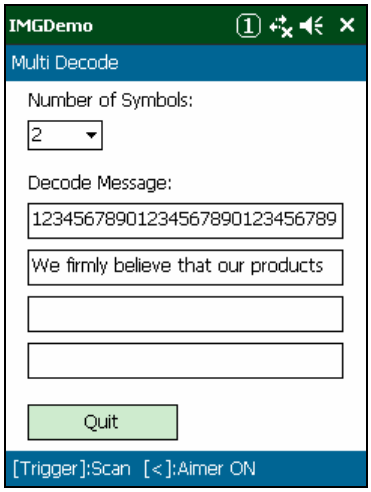


Figure 4.25

Image Capture

This mode captures an image through the CMOS Imager. Pressing the Trigger key first time displays preview of image and then capture the image when the key is pressed second time to save it in JPEG format in a storage area which is indicated at the lower part of the screen.

Figure 4.26

Sign Capture

This mode reads bar code symbol and captures signature both located in the same vicinity and then displays its result and captured signature on the screen.

Figure 4.27

4.14 Image Scanner Read

After scanning 1D bar code symbol or 2D code symbol with the integrated Imager, a result of the scanning is output to application. The output method as well as other relevant parameters for scanning can be determined by the settings made in “Imager Setting”. To display the **Settings** menu, tap the ( ) icon in the Taskbar and then choose **Settings**.

Operation Procedures

1. Navigate to **Start** → **Programs** → **Image Scanner Read** icon. As soon as the icon is tapped, it appears in the Taskbar indicating that the application is being started up.

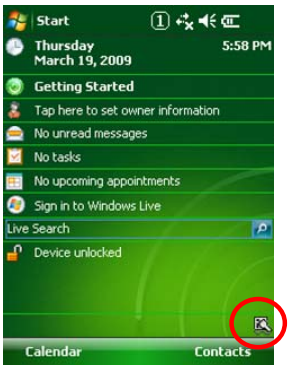


Figure 4.28

2. Start up an application that receives a result of scanning 1D bar code or 2D code symbol.
3. Scanning 1D bar code or 2D code symbol takes place when one of the Trigger keys is pressed.
4. The scanning ends when the Trigger key is released or when the preset timeout elapses.
5. The scanning result is output to the application.

Notes:

- To exit the image scanning application, tap the ( ) icon in the Taskbar and then choose **Close** menu.
- The clipboard output method copies data of scanning 1D bar code/2D code symbol into the clipboard by pasting it (by executing the keyboard event (Ctrl and V keys)). Therefore, data of scanning cannot be output to application that does not support the paste operation (the keyboard event (Ctrl and V keys)).
- These image scanning applications cannot run simultaneously with other application that occupies the integrated imager.

4.15 Internet Explorer

This application displays web pages on the Internet and Intranet.

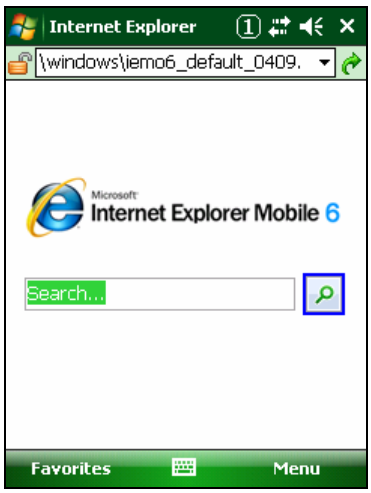


Figure 4.29

Table 4.7 Menus in the application

Menu			Description
Favorites			Displays the Favorites menu.
Menu			
	Favorites		Displays the Favorites menu.
	Add to Favorites		Adds the current page to the Favorites menu.
	Go to Web Address		Focuses on the Address Bar.
	Zoom Out		Displays the current page smaller.
	Home Page		Returns to the homepage.
	History		Changes the display to a page listed in the history.
	Forward		Changes the display to the previous page displayed prior to returning.
	Refresh		Updates the current page to the latest information.
	View		
		Text Size	Specifies the displayed font size.
		Full Screen	Hides the main menu, toolbar, etc.
		Mobile	Changes the displayed page size to reduction mode.
		Desktop	Keeps the same layout and size as on a desktop computer.
	Tools		
		Send Link	Creates a new e-mail message with a link to the current page.
		Properties	Displays the property of page.
		Option	Sets up options for security, etc.
	Copy/Paste		
		Make Selection	Starts text selection mode.
		Paste	Pastes text that are cut or copied.

4.16 Internet Sharing

This application enables your PC to use the terminal as a modem for connecting to the Internet.

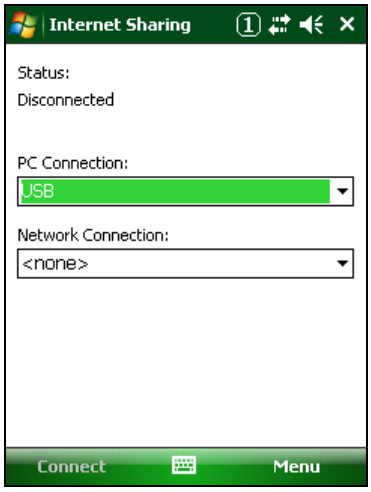


Figure 4.30

If your terminal has a data connection plan, your PC can use the terminal to connect to the Internet.

To use the terminal as a modem using a USB cable, follow the steps below.

1. On your PC, open **ActiveSync**, and navigate to **File** → **Connection Settings**.
2. Clear the **Allow USB connections** checkbox.

3. Connect the terminal to the PC using a USB cable.
4. On the terminal, navigate to **Start** → **Programs** → **Internet Sharing**.
5. Select **USB** in the **PC connection** pull-down menu.
6. Select the **Network connection** that the terminal should use to connect to the Internet.
7. Tap **Connect**. Allow approximately 30 seconds for the connection to be established.

4.17 Laser Scanner Demo

This application demonstrates the following scanning functions.

- Automatic permission of setting readable bar code symbologies
- Scanning bar codes using Trigger key.
- Displaying scanning results.

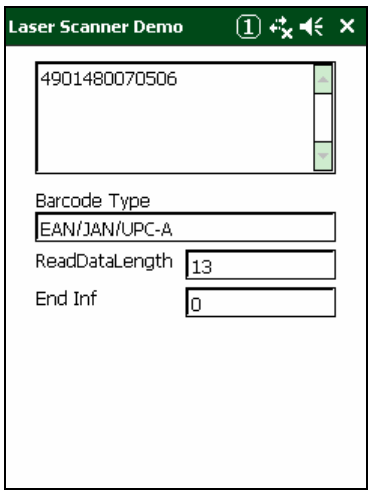


Figure 4.31

Codes appeared in the **BarCode Type** field (see Figure 4.31) refer to the respective symbologies listed in the table below.

Table 4.8

BarCode Type	Symbology
Code39	Code39
NW-7	NW-7
EAN/JAN/UPC-A Addon	WPC Addon
EAN/JAN/UPC-A	WPC
UPC-E Addon	UPC-E Addon
UPC-E	UPC-E
Industrial 2of5	Industrial 2of5
ITF	Interleaved 2of5
Code93	Code93
Code128/GS1-128(EAN128)	Code128 EAN-128 (note 1)
MSI	MSI
IATA	IATA
GS1 DataBar(RSS-14)	RSS-14 (note 2) RSS-14 Stacked (note 2)
GS1 DataBar Limited(RSS Limited)	RSS Limited (note 2)
GS1 DataBar Expanded(RSS Exp)	RSS Expanded (note 2) RSS Expanded Stacked (note 2)

Notes:

1. EAN-128 symbology changes its name to “GS1-128”.
2. The RSS symbologies change its name to “GS1 DataBar xxxx”.
   RSS-14 → GS1 DataBar Omnidirectional
   RSS Limited → GS1 DataBar Limited
   RSS Expanded → GS1 DataBar Expanded
   RSS-14 Stacked → GS1 DataBar Stacked
   RSS Expanded Stacked → GS1 DataBar Expanded Stacked

4.18 Laser Scanner Read

After scanning a bar code with the integrated Laser Scanner (model dependant), a result of the scanning is output. The output method for the scanning result is defined by the settings made in “Scanner Setting”.

Operation Procedures

1. Navigate to **Start** → **Programs** → **Laser Scanner Read** icon. The ( ) icon appeared in the Taskbar indicates that the scanning application is being started up.

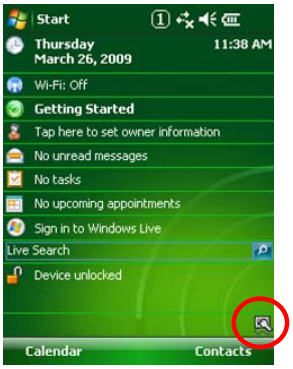


Figure 4.32

2. Start up an application that receives a result of scanning bar code.
3. Scanning a bar code will take place when Trigger key is pressed.
4. The scanning will end when the Trigger key is released or when the preset time elapses. The scanning result is output to the application.

Notes:

- To exit the laser scanning application, tap the icon in the Taskbar and then choose **Exit** menu.
- The clipboard output method copies data of scanning bar code into the clipboard by pasting it (by executing the keyboard event (Ctrl and v keys)). Therefore, data of scanning cannot be output to application that does not support the paste operation (the keyboard event (Ctrl and v keys)).
- The laser scanning application cannot run simultaneously with other application that occupies the integrated Laser Scanner.

4.19 Messaging

This application sends and receives electronic mail that supports the POP3 or IMAP4.

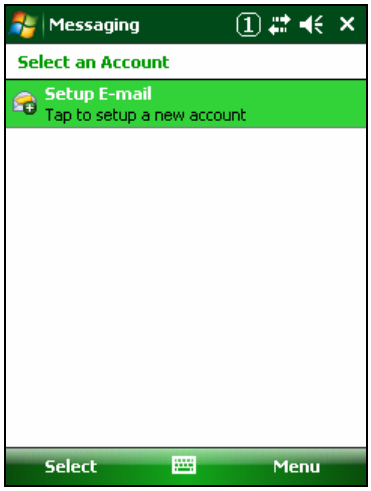


Figure 4.33

To set up a new account, see "**Setting up an e-mail account**".

Message List Screen

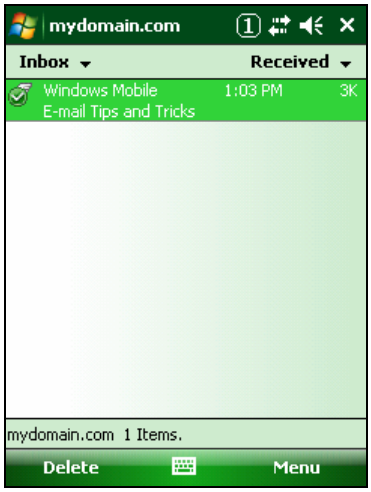


Figure 4.34

Table 4.9 Menus in the Message List Screen

Menu			Description
Delete			Deletes the selected message.
Menu			
	New		Creates a new message.
	Reply		
		Reply	Replies to the selected message.
		Reply All	Replies to sender and CC'ed recipients of the selected message.
		Forward	Forwards the selected message.
	Mark as Read		Marks the selected message as read.
	Move ...		Moves the selected message to other folder.
	Go to		
		Folders ...	Changes current folder.
	Tools		
		Sort By	Changes sort order of the message list.
		Message Type	Displays message list sorted by message type.
		From	Displays message list sorted by sender's address.
		Received	Displays message list sorted by received date.
		Subject	Displays message list sorted by subject.
		Manage Folders ...	Creates or modifies folders.
		Empty Deleted Items	Empties the Deleted Items folder.
		Clear	Deletes all messages in Inbox.
		New Account ...	Creates new account.
		Options ...	Sets up options for security, etc.
	Select Message		
		All	Selects all messages.
		All Below	
		Several	Selects several messages.
	Send/Receive		Sends and receives messages.

Viewing Screen

mydomain.com
ok
Windows Mobile
E-mail Tips and Tricks
Email Tips and Tricks: Use these tips and tricks to get the most out of your mobile e-mail experience.
Enter an e-mail address quickly: Enter the first few characters of a name or e-mail address in the To box, and you will see a short matching list of contacts from which to choose. Or you can just click or tap in the To box to open your entire contact list.
Try quick filtering to find messages: From the message list, enter letters to find messages by
Reply
Menu

Figure 4.35

Table 4.10 Menus in the Viewing Screen

Menu			Description
Reply			Replies to the message.
Menu			
	Delete		Deletes the message.
	Reply		
		Reply	Replies to the message.
		Reply All	Replies to sender and CC'ed recipients of the message.
		Forward	Forwards the message.
	Mark as Unread		Marks the message as unread.
	Move ...		Moves the message to other folder.
	View		
		Text Size	Changes the text size.
		Language	Changes the language.
	Download Message		Downloads current message with attachments.
	Send/Receive		Sends and receives messages.

Writing Screen

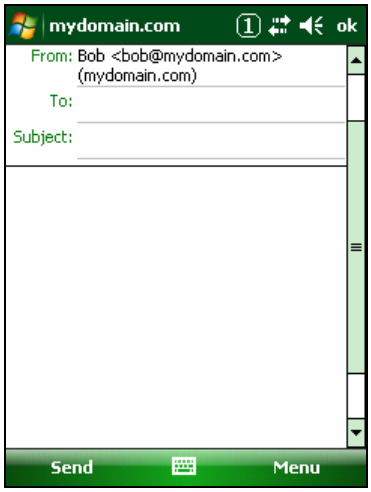


Figure 4.36

Table 4.11 Menus in the Writing Screen

Menu			Description
Send			Sends the message.
Menu			
	Add Recipient ...		Adds another contacts to recipient.
	Check Names		Searches for name stored in Contacts.
	Insert		
		Picture	Inserts a picture into the message as attachment.
		Voice Note	Inserts a voice mail into the message as attachment.
		File	Inserts a file into the message as attachment.
	My Text		Inserts a preset or frequently used phrase.
	Save to Draft		Saves the message to Draft folder.
	Spell Check		Checks the spelling.
	Cancel Message		Cancels the message to Draft folder.
	Message Option ...		Sets up options for the message.

Setting up an e-mail account

To set up an e-mail account, follow the steps below.

1. Navigate to **Setup E-mail** or navigate to **Menu** → **Tool** → **New Account**. The screen shown below appears.

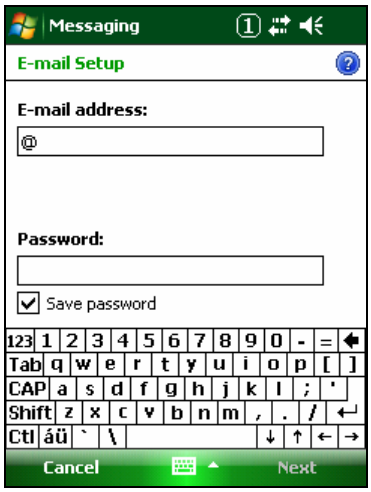


Figure 4.37

2. Enter your **E-mail address** and **Password**.
3. Tap **Next**. The screen shown below appears.

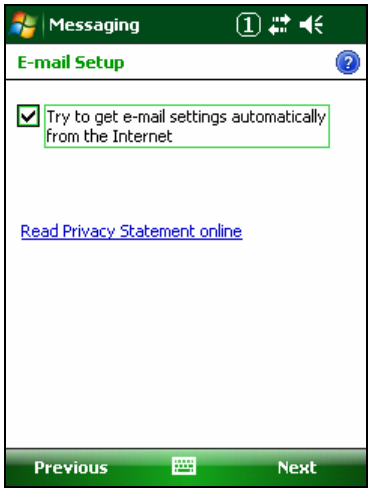


Figure 4.38

4. To allow Auto configuration to connect to the Internet, obtain e-mail server settings (if possible) and enter this information for you, select **Try to get e-mail settings automatically from the Internet** checkbox.
5. Tap **Next**. Auto configuration attempts to download necessary e-mail server settings, so you do not need to enter them manually.

6. When Auto configuration has finished, tap **Next**. The screen shown below appears.

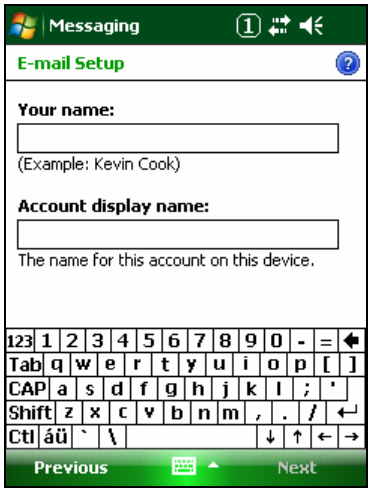


Figure 4.39

7. Enter **Your name** (the name you want displayed when you send e-mail) and **Account display name** that displays in Messaging.
8. Tap **Next**. The screen shown below appears.

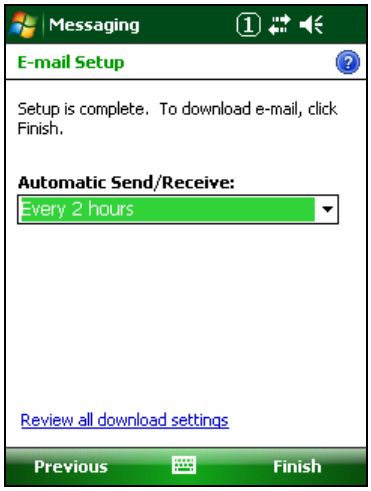


Figure 4.40

9. Select the intervals for downloading new messages from the **Automatic Send/Receive** pull-down menu.
10. Tap **Finish**.

Before tapping **Finish**, you can tap Options to access additional settings. For example:

- Limit the number of messages that are downloaded.

If Auto configuration is unsuccessful or if you have an account you access using a VPN server connection, contact your ISP or network administrator for the following information and enter it manually:

Table 4.12

Setting	Description
User name	Enter the user name assigned to you by your ISP or network administrator. This is often the first part of your e-mail address, which appears before the at sign (@).
Password	You have the option to save your password, so you do not need to enter it each time you connect to your e-mail server.
Domain	Not required for an account with an ISP. May be required for a work account.
Account type	Select POP3 or IMAP4.
Account name	Enter a unique name for the account, such as Work or Home. This name cannot be changed later.
Incoming mail server	Enter the name of your e-mail server (POP3 or IMAP4).
Outgoing mail server	Enter the name of your outgoing e-mail server (SMTP).
Require SSL connection	Select this to ensure you always receive e-mail for this account using an SSL connection. This enables you to receive personal information more securely. Please note that if you select this and your ISP does not support an SSL connection, you will not be able to connect to receive e-mail.
Outgoing mail requires authentication	Select this if your outgoing e-mail server (SMTP) requires authentication. Your user name and password from above will be used.
Use separate settings	Select this if your outgoing e-mail server requires a different user name and password than the ones you entered before.
Outgoing server settings:	
User name	Enter your user name for the outgoing e-mail server.
Password	Enter your password for the outgoing e-mail server.
Domain	Enter the domain of the outgoing e-mail server.
Require SSL for outgoing mail	Select this to ensure you always send e-mail from this account using an SSL connection. This enables you to send personal information more securely. Note that if you select this and your ISP does not support an SSL connection, you will not be able to send e-mail.

4.20 Messenger

You can use Windows Live Messenger on the terminal to chat with friends or co-workers. You must have a Windows Live ID and password to use this service.

Figure 4.41

4.21 Mobile Camera

This application captures static images.

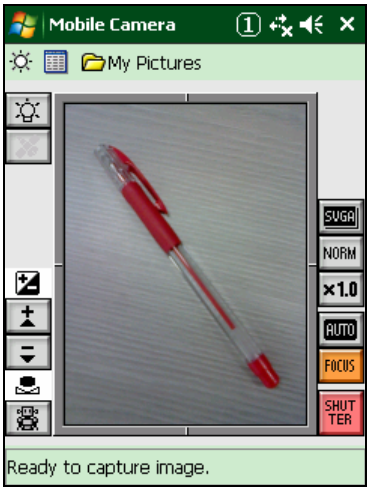


Figure 4.42 Portrait Screen

Figure 4.43 Landscape Screen

The orientation of static image is depending on the screen orientation of the terminal. See "Screen" settings.

Table 4.13 Buttons in the top Toolbar

Button		Description
	Brightness Setting	Opens Brightness Setting screen.
	List View	Launches "Pictures & Videos" application.
	Folder	Changes the folder to which captured image will be saved.

Table 4.14 Buttons in the left Toolbar

Button		Description
	LED Flash	LED can be switched to off, 50% or 100% intensity.
	Add GPS Data	Choose either "Add" or "Don't Add" to add or omit GPS data.
	Digital Flash	Switches on or off the digital flash function. The function is to enable a captured object image in darker surrounding to be visible in the screen by composing the image.
	Exposure compensation (+)	Brightens the exposure.
	Exposure compensation (-)	Darkens the exposure.
	White balance	Chooses a white balance from "Automatic", "Outdoor", "Under fluorescent lamp" and "Under light bulb".

Table 4.15 Buttons in the right Toolbar

Button		Description
	Trapezoidal Correction	Changes the trapezoidal correction to “Correct” or “Don’t correct”.
	Size	Chooses a capture size from “UXGA”, “QUADVG”, “XGA”, “SVGA”, “VGA” and “1/4VGA”.
	Image quality	Chooses an image quality from “Bitmap”, “Fine”, “Normal” and “Economy”.
	Magnification	Chooses a magnification from “1.0” and “1.5”.
	Focus function	Chooses either “Auto”, “Close-up” or “Mid-range”
	Focus operation	Pressing the Focus operation button when the Focus function is set to Auto focuses objects appearing in the center of the screen. After the camera is focused, correct the frame and press the shutter button to capture the image. This button cannot be used in Focus function modes other than Auto.
	Shutter button	Press the shutter button to capture the image. If the Focus operation button is not pressed while the Focus function is set to Auto, it is performed after the image is captured.

4.22 NetSearch

This application displays a list of partner stations communicable with the terminal via WLAN.

- Partner stations on the list can be sorted in the order of field intensity, station name and channel.
- Field intensity for the partner station currently being established with the terminal is displayed in green.
- The information appeared in the screen is updated every five seconds.
- The remote station's WLAN standard IEEE802.11 b/g icon is displayed at the head of the station name.
- A key symbol icon is displayed for stations that use encrypted communication.

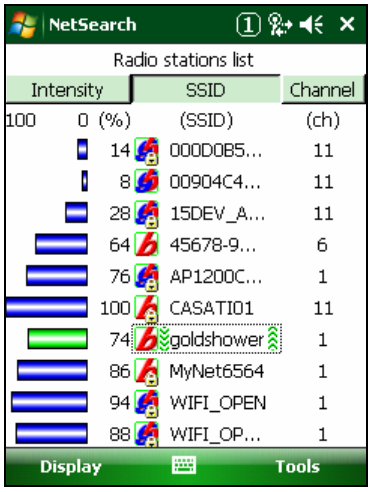


Figure 4.44

Table 4.16 Menus in the application

Menu		Description
Display		
	List View(1)	Displays a list of partner stations.
	Detail View(2)	Displays screen showing information in detail about the partner station.
	Options	Displays a screen for setting partner station parameters for searching.
	About	Displays version information.
	Exit(0)	Closes the NetSearch.
Tools		
	Ping(4)	Displays the Ping utility screen.
	Signal(5)	Displays the Signal screen.

Detail information about partner station

The screen displays the following detail about the partner station.

- SSID
- WLAN standard
- No. of channels operable
- Intensity (%)
- Encryption
- MAC address
- Status
- IP address
- Physical address

Navigate to **Start** → **Programs** → **Communication** → **NetSearch** icon to initiate the screen.

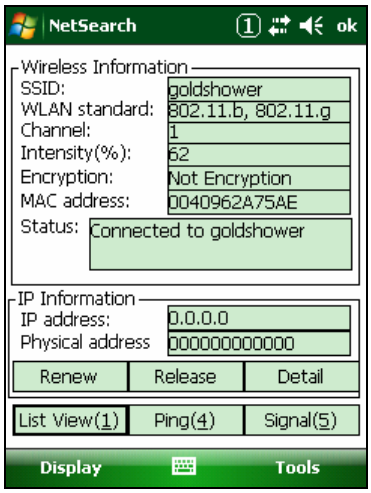


Figure 4.45

Detail Button

This button displays the log of IP in detail.

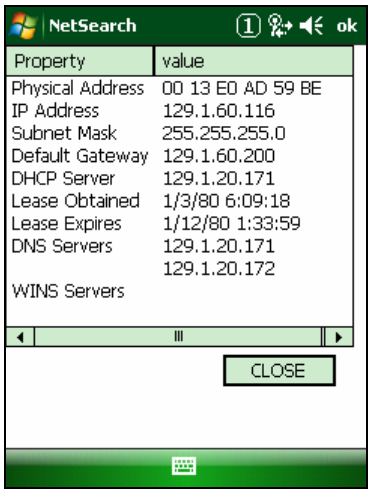


Figure 4.46

Ping(4) Button

This button (see Figure 4.45) displays the PingUtility screen.

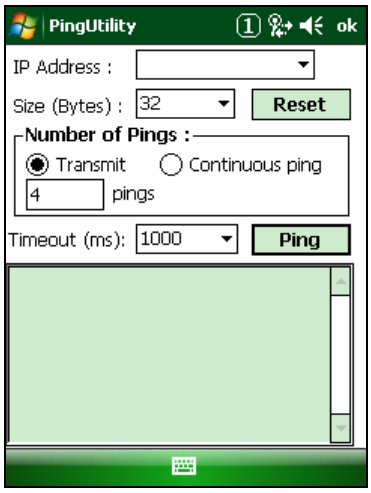


Figure 4.47

Signal(5) Button

This button (see Figure 4.45) displays the signal strength in dBm and with a yellow straight line that also indicates the signal strength in percent for the operator to judge if the signal in air is ample enough to continue WLAN operation

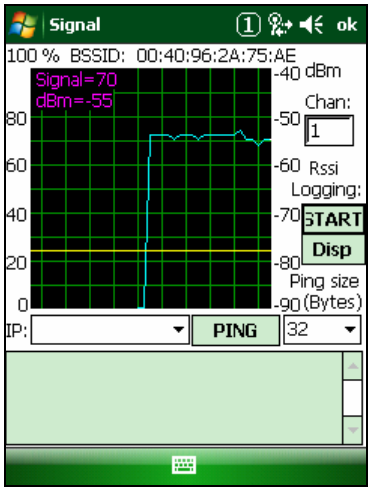


Figure 4.48

Options Screen

Navigate to **Start** → **Program** → **Communication** → **NetSearch** icon → **Display** and then choose **Options** in the menu to display following screen.

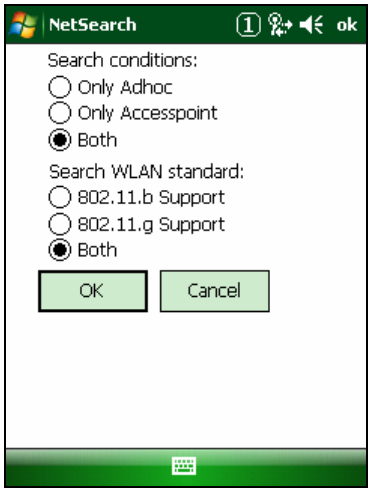


Figure 4.49

Search conditions

Choose a partner station to be searched via a way of either **Only AdHoc** or **Only Accesspoint** or **Both**.

Search WLAN Standard

Choose a partner station to be searched via a WLAN standard either **802.11.b Support** (IEEE802.11b standard) or **802.11.g Support** (IEEE802.11g standard) or **Both**.

4.23 Notes

This application enables you to jot a quick note.

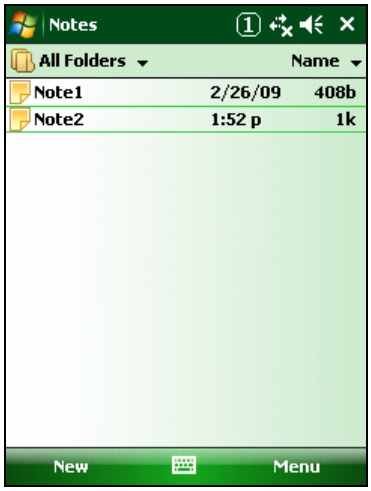


Figure 4.50

To create a new note, tap New.
To edit an existing note, tap the file name.

Table 4.17 Menus in the List view

Menu		Description
New		Creates a new note.
Menu		
	View Recording Toolbar	Shows or hides Recording Toolbar.
	Rename/Move	Renames or moves the selected notes.
	Delete	Deletes the selected notes.
	Create Copy	Creates a copy of the selected note.
	Select All	Selects all notes in the list.
	Send ...	Creates a new e-mail message with the selected note attached.
	Beam ...	Sends the selected note via IrDA or Bluetooth.
	Options ...	Sets up options for Recording.

Recording Toolbar

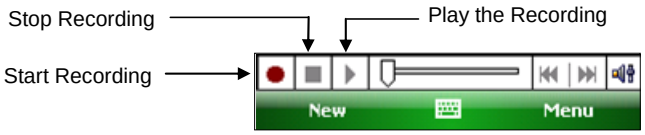


Figure 4.51

To begin recording, tap the Record button.
To end recording, tap the Stop button.

Editing Screen

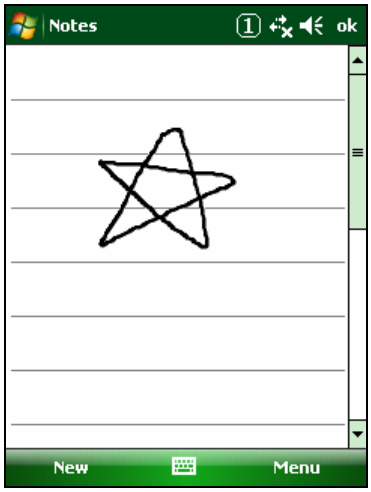


Figure 4.52

Table 4.18 Menus in the Editing Screen

Menu			Description
New			Creates a new note.
Menu			
	View Recording Toolbar		Shows or hides Recording Toolbar.
	Draw		Turns Draw mode on or off.
	Undo		Undoes the last action.
	Redo		Redoes the last Undo command.
	Cut		Cuts the selected items in the current note.
	Copy		Copies the selected items in the current note.
	Paste		Pastes the items that are cut or copied.
	Edit		
		Clear	Deletes the selected items in the current note.
		Select All	Selects all items in the current note.
	Zoom		Changes the display size.
	Tools		
		Rename/Move	Renames or Moves the current note.
		Delete	Deletes the current note.
		Send ...	Creates a new e-mail message with the current note attached.
		Beam ...	Sends the current note via IrDA or Bluetooth.

4.24 Pictures & Videos

This application enables you to view and share digital pictures & videos.

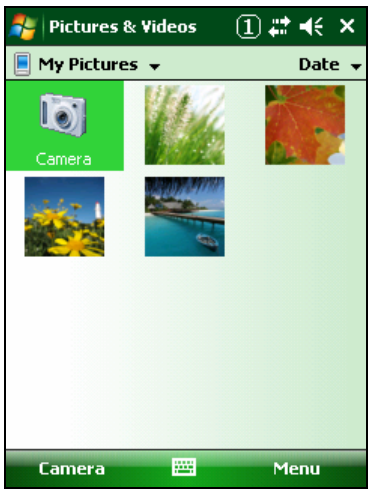


Figure 4.53

To view picture and video clips, tap the picture or video clip to view.

To take a photo, do one of the following:

- Tap Camera icon.
- Tap **Camera** on the command bar.
- Navigate to **Menu** → **Camera**.

Table 4.19 Menus in the List view

Menu	Description
Camera	Launches “Mobile Camera” application.
View	Displays the selected picture.
Menu	
Camera	Launches “Mobile Camera” application.
Send ...	Creates a new e-mail message with the selected file attached.
Beam ...	Sends the selected file via IrDA or Bluetooth.
Save to Contacts ...	Attaches the selected picture to the Contact item.
Delete	Deletes the selected picture or video.
Edit	
Cut	Cuts the selected picture or video.
Copy	Copies the selected picture or video.
Paste	Pastes picture or video that are cut or copied.
New Folder	Creates a new folder.
Play Slide Show	Plays pictures as slide show.
Set as Today Background ...	Sets the selected picture as a Today's wallpaper.
Go to	
My Pictures	Opens My Pictures folder.
My Device	Opens root folder.
Folders ...	Opens specified folder.
Tools	
Properties	Displays the property of the selected file.
Sort By	
Name	Displays the list sorted by name.
Date	Displays the list sorted by date.
Size	Displays the list sorted by file size.
Options ...	Sets up options for Slide Show, etc.
Send to your space	Sends the selected file to your Windows Live space.

Viewing Screen

Figure 4.54

To edit the picture, navigate to **Menu** → **Edit**.

Table 4.20 Menus in the Viewing Screen

Menu			Description
Send			Creates a new e-mail message with the picture attached.
Menu			
	Zoom		Opens the sub window for zooming the picture.
	Play Slide Show		Plays pictures as slide show.
	Set as Today Background ...		Sets current picture as a Today's wallpaper.
	Beam Picture		Sends current file via IrDA or Bluetooth.
	Save		
		Save to Contacts ...	Attaches current picture to the Contact item.
		Save As ...	Saves the picture with new name.
	Edit		Switches to the Editing Screen.
	Properties		Displays the property of current file.
	Options ...		Sets up options for rotation, etc.
	Send to your space		Sends current file to your Windows Live space.

Editing Screen

Figure 4.55

Table 4.21 Menus in the Editing Screen

Menu		Description
Rotate		Flips the picture 90 degree.
Menu		
	Crop	Crops the picture by drawing a box.
	Auto Correct	Adjusts the brightness and contrast levels of the picture.
	Undo	Undoes the last action.
	Revert to Saved	Reloads the last version of the image from the file.
	Save As ...	Saves the picture with new name.

4.25 Remote Desktop Mobile

This application is the RDP6.0 based remote desktop client.

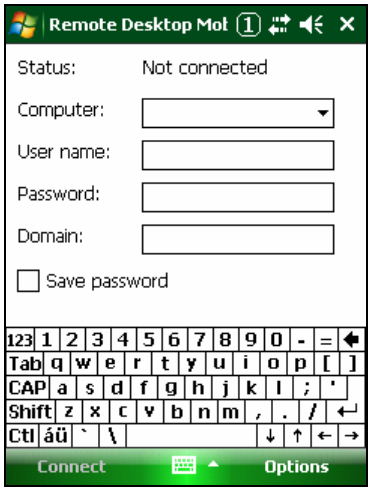


Figure 4.56

The following is the procedure.

1. Do the following:
   - In **Computer,** enter the name of the computer to which you want to connect.
   - Enter your **User name** and **Password**.
   - Enter **Domain**, if required.
   - Select **Save password**.
2. Tap **Connect**.

To improve display performance for Remote Desktop Mobile, tap **Options** to change the parameters.

4.26 Search

The application can search for files and other items stored on the terminal in the My Documents folder or on a storage card.

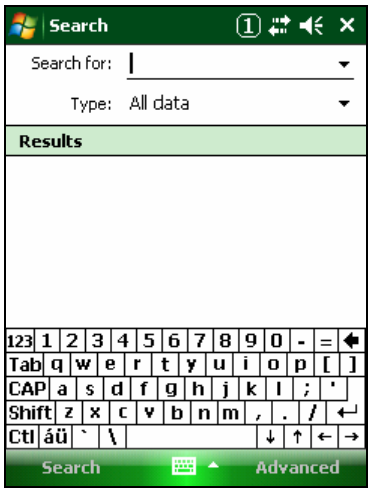


Figure 4.57

To search for a file or an item, follow the steps below.

1. Enter the file name, word, or other information you want to **Search for** field.
2. In **Type** pull-down menu, select a data type to help narrow your search.
3. Tap **Search**.

4.27 Task Manager

This application is used to view running tasks, switch tasks, and stop tasks.

See 3.26 “Task Manager” for detail.

4.28 Tasks

This application lets you keep track of jobs and tasks you need to do.

Figure 4.58

To create a new Appointment, tap **Tap here to add a new task** or navigate to **Menu → New Task**.

Table 4.22 Menus in the application

Menu			Description
Complete			Marks the selected Task as completed.
Menu			
	New Task		Creates a new Task.
	Beam Task ...		Sends the selected Task via IrDA or Bluetooth.
	Delete Task		Deletes the selected Task.
	Edit		
		Cut	Cuts the selected Task.
		Copy	Copies the selected Task.
		Paste	Pastes Task that are cut or copied.
	Options ...		Sets up options for Task.
	Sort By		
		Status	Displays Task list sorted by Status.
		Priority	Displays Task list sorted by Priority.
		Subject	Displays Task list sorted by Subject.
		Start Date	Displays Task list sorted by Start Date.
		Due Date	Displays Task list sorted by Due Date.
	Filter		
		All Tasks	Displays all Tasks.
		Recently viewed	Displays Tasks you have recently added, edited, or viewed.
		No Categories	Displays all Tasks with no category.
		Active Tasks	Displays all Tasks with a start date before and on the current date.
		Completed Tasks	Displays all Tasks marked completed.

4.29 Windows Live

You can use Windows Live on the terminal to find information on the web.
You must have a Windows Live ID and password to use this service.

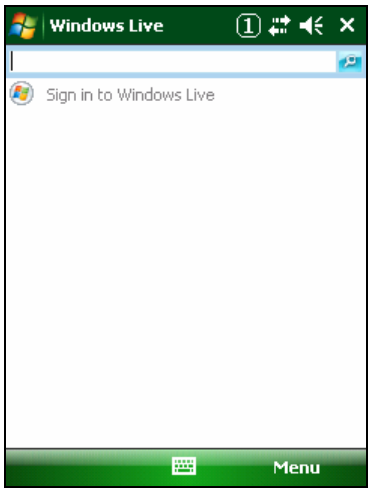


Figure 4.59

4.30 Windows Media

The terminal includes Windows Media Player Mobile, a program that plays music and videos. It can play media files that are stored on the terminal as well as songs and videos that you stream from the Internet.
The media player also plays streaming TV, if this service is available from your provider.
Windows Media Player Mobile also helps you organize your media files. After you save media files to your terminal, you can create playlists of both music and video files.

Windows Media Player Mobile gives you access to the following folders:

- My Music, which holds sound files downloaded to your terminal, and any files that you add.
- My Videos, which holds video files downloaded to your terminal, and any files that you add.
- My TV, which holds television programs downloaded to your terminal.
- My Playlists, which holds the playlists that you create.

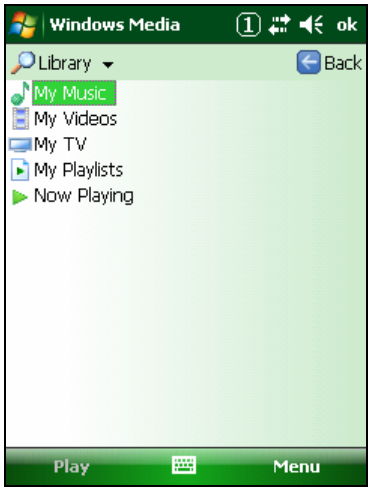


Figure 4.60

Table 4.23 Menus in the Library view

Menu		Description
Play		Plays the selected file.
Menu		
	Queue Up	Adds the selected file to the playlist.
	Delete from Library	Deletes the selected file from Library.
	Now Playing	Switches to Now Playing Screen.
	Library	Changes to another library.
	Update Library ...	Updates the library manually.
	Open File ...	Plays music or video stored in the terminal.
	Open URL ...	Plays music or video stored on the Internet.
	Properties	Displays the property of the selected file.

Playing Screen

Figure 4.61

Table 4.24 Menus in the Play Screen

Menu			Description
Now Playing			Switches to Now Playing Screen.
Menu			
	Library		Switches to Library view.
	Play/Pause		Starts or pauses the playing of a file.
	Stop		Ends the playing of a file.
	Shuffle/Repeat		
		Shuffle	Plays the playlist randomly.
		Repeat	Plays the playlist repeatedly.
	Full Screen		Hides the main menu, toolbar, etc.
	Options ...		Sets up options for playing.
	Properties		Displays the property of the current file.
	About		Displays version information.

Now Playing Screen

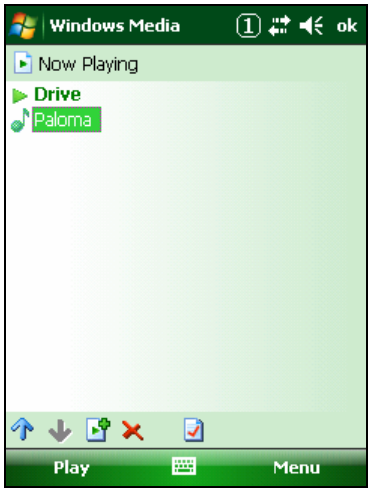


Figure 4.62

Table 4.25 Menus in the Now Playing Screen

Menu			Description
Play			Plays the selected file.
Menu			
	Library		Switches to Library view.
	Move Up		Moves the selected file up in the playlist.
	Move Down		Moves the selected file down in the playlist.
	Remove from Playlist		Removes the selected file from the playlist.
	Shuffle/Repeat		
		Shuffle	Plays the playlist randomly.
		Repeat	Plays the playlist repeatedly.
	Save Playlist		Saves the playlist.
	Clear Now Playing		Removes all items from the playlist.
	Error Details		Displays detail error message.
	Properties		Displays the property of the selected file.

5. Utilities

The utilities listed in the table below are mainly used as a co-process or auxiliary program in user applications.

Table 5.1

Utility	Description	CASIO	MS
FCHKCE	Confirms a result of data upload/download.	Yes	--
Auto Setup	Carries out automatically application at time of reset on the terminal.	Yes	--
TextEditor	Rich text editor	Yes	--
CT Client	Measures the WLAN communication status.	Yes	--
DiskClean	Format user disk and initialize RAM as the same status of the factory prior to shipment.	Yes	--

MS; Microsoft

5.1 FCHKCE

This utility checks a result of data upload/download. See the LMWIN Utility manual for detail.

5.2 Auto Setup

This utility automatically sets up a specified application.

Execution Timing

The timing for executing “Auto Setup” is as follows.
When the terminal is reset;
The utility carries out **Setup.exe** in the FlashDisk.

Location of application for automatically stating up with Auto Setup

Location of applications to be automatically set up with this utility is **CE\ARM** folder of the FlashDisk.

Customizing in the Registry

Performances of the “Auto Setup” can be automatically customized by changing the parameters in the following registry.
[HKEY_LOCAL_MACHINE\Drivers\CASIO\UTIL]

Table 5.2

Key	Setting Value	Description
FLSETUP	sz: “1”	Carries out **Setup.exe** for the FlashDisk at a time of reset on the terminal.

Notes:

- Once the registry is deleted, the applicable application does not automatically start up.
- The registry is initialized to its factory setting by performing a full reset on the terminal.
- Since automatic startup of applications with the utility is performed every time when a reset is performed on the terminal, it should be avoided by controlling the automatic startup for each applicable application.

5.3 TextEditor

This utility can display and edit text files such as log files and ini files.

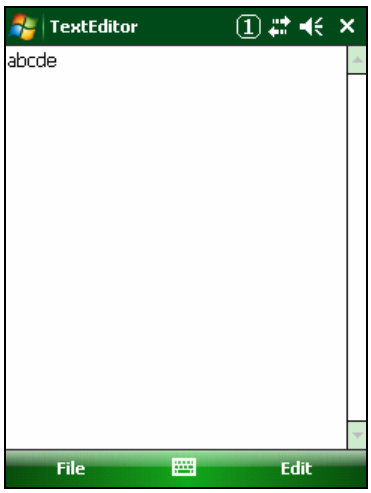


Figure 5.1

Table 5.3 Menus in the application

Menu		Description
File		
	New	Creates new text.
	Open …	Displays existing document file.
	Save	Saves document file by overwritten.
	Save As …	Saves document file with a specified name.
	Recent Files	Displays recently displayed document file names.
	Version	Displays version information.
Edit		
	Undo	Restores the previous operation.
	Cut	Cuts document in the selected range.
	Copy	Copies document in the selected range.
	Paste	Pastes document specified for cut or copy.

5.4 CT Client

This utility performs status checking in the WLAN communication together with PC based server.

Note:
Refer to the “WLAN Survey Tool” manual for detail.

5.5 DSKClean

This utility formats the user disk and initializes RAM to the factory condition, and reloads OS again from OS disk. This procedure is called **User Disk Clear**. See “Reset” for detail.

Starting Up the User Disk Clear

1. Double tap **DSKClean.exe** located under Windows folder. Then screen shown in Figure 5.2 appears. Tap **OK** button to continue the rest of the operation.

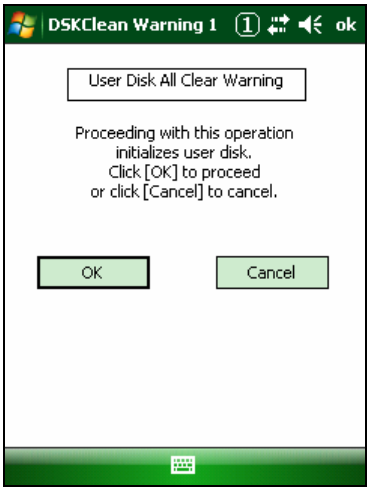


Figure 5.2

2. The screen below appears to confirm the operation. Tap **OK** button to continue.

Figure 5.3

3. The screen below appears, and then approximately 5 seconds later formatting the user disk and initializing RAM will automatically start.

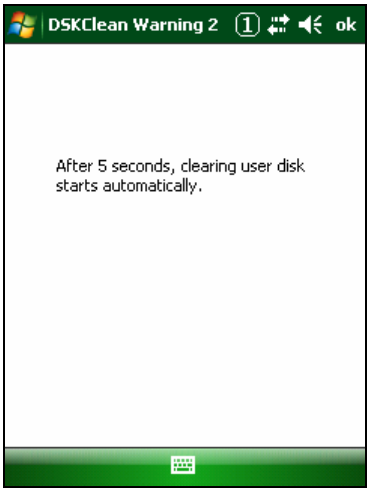


Figure 5.4

4. After formatting the user disk and initializing RAM are complete, the terminal suspends and resumes automatically to reload the OS from the OS disk.

6. PC Application Programs

The following are applications run on the host PC which is linked to the terminal.

Table 6.1

Application	Description	CASIO	MS
ActiveSync	Carries out data link with the terminal.	--	Yes
Windows Mobile Device Center	Carries out data link with the terminal.	--	Yes
LMWIN	Carries out data upload/download.	Yes	--
FCHK	Checks and confirms a result data upload/download.	Yes	--

MS; Microsoft.

6.1 ActiveSync

By linking with the ActiveSync client installed in the terminal, this utility makes communication with the terminal possible. It is available from the following site.
http://www.microsoft.com/windowsmobile/activesync/activesync45.mspx

Note:
Be sure to download the version 4.5 or later of ActiveSync for the operations described in this reference manual.

6.2 Windows Mobile Device Center (WMDC)

The Windows Mobile Device Center (“WMDC”) performs data communication with the terminal. Window Vista users can use the WMDC to connect the terminal and the PC (users of Windows XP and all previous operating systems should refer to 6.1 ActiveSync).
The Windows Mobile Device Center (WMDC) can be downloaded at the URL below.
http://www.microsoft.com/windowsmobile/devicecenter.mspx

Notes:

- The terminal cannot establish connection via the Windows Mobile Device Center without first modifying its factory settings. In order to establish connection, it is necessary to use the USB connection configuration tool to change the terminal’s settings when connecting the terminal to a PC.
- Be sure to use Windows Mobile Device Center 6.1 or later version. An earlier version of the WMDC does not support devices including DT-X30 series handheld terminals with integrated Windows Mobile OS.

6.3 LMWIN

This utility interoperates with the FLCE installed in the terminal to perform data upload and download. It is an option available separately. See LMWIN Utility manual for detail.

6.4 FCHK

This utility checks and confirms results of data upload/download. See LMWIN Utility manual for detail.